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FORMERLY

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(Original Official Organ U. S. Vet. Med. Ass'n.)

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CONTENTS

Editorial 139
Applications for Membership 145
Coming Veterinary Meetings 145
Publications Received 146
Papers:
Comparative Studies on Vesicular Stomatitis and Foot-and-Mouth Disease—Peter K. Olitsky, Jacob Traum and Harry W. Schoening 147
The Causal Agent of Vesicular Stomatitis Proved to be a Filter-Passing Virus—W. E. Cotton 165
Teaching Veterinary Medicine to Agricultural Students—David S. White 185
Are Veterinary Colleges Supplying the Need of Veterinary Education?—C. H. Stange 196
Education and Veterinary Medicine—Veranus A. Moore 201
Surgery of the Head of the Horse—H. E. Bemis 210
A Rapid Method for Performing the Agglutination Test in the Serum Diagnosis of Bang's Abortion Disease in Cattle—I. Forest Huddleson and E. R. Carlson 229
Descriptive Identification of Canines and Felines—J. G. Horning, H. E. Keller, A. J. McKee and K. K. Smith 234
Clinical and Case Reports:
Impaction of the Colon in a Dog—Gerry B. Schmalle 238
Congenital Diaphragmatic Hernia—John G. Hardenbergh 239
Ablation of the Udder—John F. Rankin 241
Reviews 243
Abstracts 244
Army Veterinary Service 247
Miscellaneous 248
Communications 252
Association News 257
Necrology 268
Personals 274

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Vol. LXX, N. S. Vol. 23 **November, 1926** **No. 2**

CALLED

Two months, almost to a day, after the close of the Lexington meeting of the A. V. M. A., the Almighty saw fit to call to Him the man who presided over that great gathering—John William Adams. Just a few hours before the final summons came, we sat in his office, in the Veterinary School of the institution of which he was such an illustrious son, and chatted over the events of the year. Before the final good-bye was said, Dr. Adams asked this question: "We had a pretty successful year, didn't we?" His face lit up when we told him that the A. V. M. A. had made some very appreciable progress during his administration. He seemed genuinely pleased and the smile that came to his fine face will be a pleasant recollection during the years to come. Having known him since boyhood, we had seen him smile on many different occasions—on the street, in the class-room and clinic, in the meeting-hall, in his office—in fact, it just seemed natural for him to do and say things with a smile. How much better it is to remember him just that way.

As when a kingly cedar, green with boughs,
Goes down with a great shout upon the hills,
And leaves a lonesome place against the sky.

HOWARD SYLVESTER MURPHEY

An Appreciation*

It is difficult, on such an occasion, for one to find words to express the appreciation we have for the fine things in a life brought to a premature close.

Dr. Murphey came to Iowa State College seventeen years ago and his life's work was done here. It has become a part of the ideals, the service and the opportunities the College offers to young men coming to it. When it came time to develop and expand the Veterinary College, in 1909, we attempted to secure a faculty composed of young men, of a good moral standard, with ambition, ability and a determination to do things. Above all, we wanted men with a sense of loyalty to their co-workers and the policies and principles of the institution employing them. It was at this time, in the fall of 1909, when Dr. Murphey joined the faculty of Iowa State College. Our deceased colleague possessed all the desired qualities, to a remarkable degree.

His work is a record of which any man may feel proud. Dr Murphey, with several other members of the staff who joined the faculty about the same time, have worked together and those who have worked closest to him learned to appreciate him most. His careful, calculating methods, his scientific turn of mind, his research instinct and, above all, his loyalty to the men with whom he worked and his loyalty to the policies and standards of the institution contributed to the success and the standing of Iowa State College to an extent which only a few of us can appreciate. His devotion to his work and to his profession can not be surpassed and personally I have never had a more loyal co-worker. When Dr. Murphey came in for a conference about his work he always had a carefully-thought-out plan and after a conference one could always depend on the work going forward as planned. He was a tireless worker and as a teacher and research worker his efforts are recognized as of a superior quality, not only by his students and other members of his faculty, but by the profession generally, not only in this country but in foreign lands.

It is a great loss to us and to our institution, for such a man in the prime of life to be taken away, but we should remember how fortunate we have been during the last seventeen years in

*Delivered at the funeral services by Dean C. H. Stange.

having him as a co-worker, a friend and a colleague. We shall always remember his fine work and his contributions to the College and his profession and the many things we have gained as a result of his having lived.

C. H. S.

PAYING THE PRICE

Farmers throughout the Corn Belt, during the past month, have been paying the high price for taking unnecesary chances with hog cholera. What is probably the worst outbreak of hog cholera to be experienced for over ten years is raging in certain sections of the Corn Belt. Veterinarians know that the most important factor in this outbreak is the large percentage of susceptible hogs throughout the country. It is the old story over again and, in all probability, it will be told again, many times in the future.

With a gradual decrease, year by year, in the prevalence of the disease, raisers of hogs have come to feel that they would be wasting money spent for vaccination against hog cholera. They have undoubtedly been considerably influenced in arriving at this opinion as a result of the activities of some of the county farm bureaus throughout the Central West. These organizations, early each year, have contracted for the delivery of large quantities of anti-hog cholera serum. A limited supply of the serum has been kept on hand, available for use when needed, and the members of these farm bureaus have been led to believe that they could secure practically any quantity that might be needed on very short notice and at prices which would be reasonable. This has undoubtedly had the effect of causing many farmers to postpone or even to do away entirely with vaccination. As a result, it has been estimated by competent authorities that not over one hog in five was immunized this year, up to the beginning of the present outbreak.

The spread of the disease has been assisted in many places by weather conditions. Heavy rains have flooded large territories, causing streams to overflow their banks and spread infection in many directions. The same factor has undoubtedly operated to lower the vitality of the hogs in these territories, where it has been impossible to maintain anything like sanitary conditions for weeks at a time.

The use of anti-hog cholera serum has been falling off to a marked degree, during recent years, and serum-producers have

necessarily curtailed their output. It would be business suicide for producers to manufacture a large quantity of a perishable product, like anti-hog cholera serum, without the prospect of a market. As a result, the reserve supply of serum disappeared almost over night, when the demand came. Now swine-raisers are paying the price of their false economy. Those who have found themselves in infected territories and unable to secure serum have paid the price with dead hogs. Those who have been able to secure serum have paid the high price by reason of the fact that it has required two or three times as much serum to vaccinate the same herd that would have been required in July, when pigs were smaller and considerably less serum would have been necessary. They have also had to pay a much higher price, in some cases, for any serum they have been fortunate enough to secure. On top of all this, the delays incident to vaccinating the hogs, as a result of the serum shortage, have made results unsatisfactory in many cases, by reason of the fact that some of the hogs had become infected before serum was available.

The situation became so serious, early in October, that the United States Department of Agriculture shortened the official test of anti-hog cholera serum from twenty-one to eleven days, thereby releasing large quantities of serum ten days earlier than would ordinarily have been the case. A few days later, it beame necessary to allow serum to be released without any test at all, following the almost frantic requests of certain live stock sanitary control officials throughout the Corn Belt. All serum released under this emergency condition must be plainly labeled with the following legend: "This serum has not been tested."

Although producers have been permitted to waive all potency tests for the time being, no regulations have been waived with regard to sanitation and methods used in the production of serum in laboratories operating under a government license. There are in the neighborhood of sixty establishments engaged in the production of anti-hog cholera serum at the present time. Many of these have been working night and day in an effort to catch up with the demand for serum. Tail-bleeding has been temporarily dispensed with in some plants and the hyperimmunes throat-bled just as soon as possible, to speed up production. In some parts of the country, Iowa for example, necrotic enteritis has been reported as complicating the situation. The economic significance of the present outbreak was reflected in the provisions and corn markets, as reported by the Chicago Board of Trade

during October. Thousands of light hogs have been sent to market from exposed territories, where serum was unobtainable, causing an additional loss to the farmers through depressed prices, the natural result of a glutted market, not to mention the loss incident to the shipment of hogs before the completion of their feeding and growing period. From one section in Indiana comes the report that fertilizing plants have been overtaxed in the work of rendering hogs dead from cholera.

Farmers have nobody to blame but themselves. They have been warned times without number. It does not pay to gamble with hog cholera—a preventable disease.

STUDENT ENROLLMENT FOR 1926-27

Some of the veterinary colleges have reported very encouraging increases in their freshman enrollment figures this fall. Colorado reports an increase of ten, just doubling the size of the freshman class last year. Cornell shows an increase of six; Georgia, one; Iowa, two; Michigan, seven; Ohio, eight; Texas and Washington, one each. The total freshman enrollment is in the neighborhood of 200, a net increase over last year of approximately 15 per cent. The total enrollment for all classes is the highest in five years.

In the table presented herewith, a slight change from the tables of previous years has been made, in an effort to show the actual number of students working for a veterinary degree. In the column headed "Special" are the students not definitely assigned to any one of the four regular classes. Those included under "Graduate" are men who already have a veterinary degree and are taking either special work of undergraduate grade or regularly prescribed postgraduate courses for credit.

Numerous press articles have appeared during recent months, emanating from veterinary college deans, directing attention to the possibilities of a shortage of veterinarians at some time in the future, possibly sooner than some of us anticipate.

Dean David S. White, of Ohio State University, is reported to have said:

> To encourage young men to study veterinary medicine, the University has removed the extra fee ordinarily required of students from outside Ohio. The first effect of the action was noted this fall in a slight increase in the enrollment in the college for the first time in years. . . . . It is fallacious to think that the automobile has lessened the need for veterinarians and likewise to think of the veterinary doctor as a horse doctor. . . . . The live stock industry, with its $10,000,000,000 investment, looks to the veterinarian for its care and protection.

Dean Ward Giltner, of Michigan State College, in commenting on the big increase in the enrollment of freshman veterinary students at his insitution, is quoted as follows:

> I am at a loss to account for this sudden increase in students, unless it is due to the more favorable economic conditions in the State. . . . They (young men) are influenced, too, by the doctors and veterinarians whom they know. If the veterinarian looks prosperous, has a fine car and a large house, the student who is looking about for a profession is inclined to choose that work. Of course, this influence, conscious or not, plays a large part in determining the number and kind of students who come to college.

Dean C. A. Cary, of Alabama Polytechnic Institute, has directed attention to the field of veterinary medicine as being particularly attractive at this time. Under the heading, "Veterinarians Needed," the Keithsburg (Ill.) *News* ran the following editorial, early in September.

> Improved conditions in the live stock industry, together with the breeding of better animals and the extension of sanitary measures, have increased the demand for graduate veterinarians, according to Dr. C. A. Cary, head of the veterinary department of the Alabama Polytechnic Institute, which has graduated more than 200 veterinarians during the last few years.
>
> The upward trend of values has stimulated the live stock industry, particularly in the production of beef cattle, dairy produce, poultry and mules. The dog industry is also breeding a greater number of valuable dogs than ever before. There is an increasing demand for trained superintendents for sanitary abattoirs, milk and food inspectors and other positions which are most acceptably filled by graduate veterinarians.
>
> Dr. Cary enumerated a number of graduates who have done well in private practice, some reaching a gross income of more than $17,000 annually. Others have devoted themselves to teaching in agricultural colleges, some have entered the government service in the Bureau of Animal Industry and the United States Army, while many are connected with state departments concerned with disease prevention and inspection work.
>
> In view of Dr. Cary's statement that there is an excellent and growing field for graduate veterinarians, it may be expected that more young men, particularly those who have a liking for animals, will consider entering this promising and useful profession.

	Fresh	Soph.	Jun.	Sen.	Spec.	Grad.	Total	1925-6	Change
Alabama P. I.	4	4	4	3	2	0	17	16	+ 1
Colorado A. C.	20	5	11	11	2	2	51	48	+ 3
Cornell Univ.	30	22	17	28	0	8	105	90	+15
Georgia S. C.	4	1	6	2	1	0	14	17	— 3
Iowa State C.	37	25	17	26	0	4	109	90	+19
Kansas S. A. C.	18	17	19	5	0	5	64	58	+ 6
Michigan S. C.	11	5	2	10	2	8	38	32	+ 6
Montreal Univ.	3	6	5	3	0	0	17	18	— 1
Ohio State U.	25	10	12	8	0	0	55	55	0
Ontario V. C.	15	22	20	10	0	0	67	70	— 3
Penna., Univ. of	15	15	23	9	3	2	67	58	+ 9
Texas A. & M. C.	2	4	2	3	0	0	11	11	0
Washington S. C.	14	17	7	4	0	0	42	39	+ 3
Totals	198	153	145	122	10	29	657	602	+55

APPLICATIONS FOR MEMBERSHIP

(See October, 1926, JOURNAL)

FIRST LISTING

GOODMAN, LAURENCE WILLIAM 40 W. 61st St., New York, N. Y.
D. V. M., Cornell University, 1926
Vouchers: C. G. Rohrer and J. Elliott Crawford.

SCHMEES, H. W. 1442 E. 23rd St., Oklahoma City, Okla.
D. V. M., U. S. College of Veterinary Surgeons, 1921
Vouchers: M. Jacob and G. A. Metcalf.

SHAPERA, SOL. 305 W. Boston Post Road, Mamaroneck, N. Y.
D. V. M., Ohio State University, 1921
Vouchers: Orville E. McKim and S. D. Shoulkin.

WASHBURN, ROBERT E. 26 Washington St., Gloverville, N. Y.
M. D. V., McKillip Veterinary College, 1909
Vouchers: Lloyd E. Moore and Arthur L. Smith.

WILCOX, ARTHUR A. LaGrange, Ohio
D. V. M., Ohio State University, 1912
Vouchers: W. H. Redhead and Roy F. Leslie.

Applications Pending

SECOND LISTING

Burns, Patton Wright, College Station, Texas.
Burns, Hermann, 41 Cliff St., Ottawa, Ont.
McCormick, H. L., Wilkinson, Ind.
McPhail, Joseph N., Morocco, Ind.
Morgan, Lenord Charles, Greenfield, Ind.
Norget, Leigh A., Henrietta, N. Y.
O'Neal, Wayne S., Box 95, St. Charles, Mo.
Payne, Charles Foster, Box 138, National Stock Yards, Ill.

The amount that should accompany an application filed this month is $5.83, which covers membership fee and dues to January 1, 1927, including subscription to the JOURNAL.

COMING VETERINARY MEETINGS

New York City, Veterinary Medical Association of. Academy of Medicine, 17 W. 43rd St., New York, N. Y. Nov. 3, 1926. Dr. C. G. Rohrer, Secretary, 40 W. 61st St., New York, N. Y.

San Diego-Imperial Veterinary Medical Association. San Diego Calif. Nov. 3, 1926. Dr. W. G. Oliver, Secretary, 3821 Arizona St., San Diego, Calif.

Connecticut Veterinary Medical Association. Hotel Garde, New Haven, Conn. Nov. 3, 1926. Dr. Geo. E. Corwin, Secretary, 11 Warrenton Ave., Hartford, Conn.

Southeastern States Veterinary Medical Association. Alabama Polytechnic Institute, Auburn, Ala. Nov. 8-9, 1926. Dr. J. I. Handley, Secretary, Box 1533, Atlanta, Ga.

Chicago Veterinary Society. Great Northern Hotel, Chicago, Ill. Nov. 9, 1926. Dr. J. B. Jaffray, Secretary, 2956 Washington Blvd., Chicago, Ill.

Southeastern Michigan Veterinary Medical Association. Detroit, Mich. Nov. 10, 1926. Dr. H. Preston Hoskins, Secretary, 716 Book Bldg., Detroit, Mich.

Southwestern Michigan Veterinary Medical Association. Kalamazoo, Mich. Nov. 11, 1926. Dr. John A. Schaefer, Secretary, Bangor, Mich.

Kansas City Association of Veterinarians. New Baltimore Hotel, Kansas City, Mo. Nov. 16, 1926. Dr. J. D. Ray, Secretary, 400 New Centre Bldg., Kansas City, Mo.

Massachusetts Veterinary Association. 20th Century Club, 3 Joy St., Boston, Mass. Nov. 17, 1926. Dr. H. W. Jakeman, Secretary, 44 Bromfield St., Boston, Mass.

Illinois State Veterinary Medical Association. Lexington Hotel, Chicago, Ill. Nov. 29-30, 1926. Dr. W. H. Welch, Secretary, Lexington, Ill.

U. S. Live Stock Sanitary Association. La Salle Hotel, Chicago, Ill. Dec. 1-2-3, 1926. Dr. O. E. Dyson, Secretary, Live Stock Exchange Bldg., Wichita, Kans.

B. A. I. Veterinarians, National Association of. Chicago, Ill. Dec. 1-2-3, 1926. Dr. J. S. Grove, Secretary, 1715 Belmont Ave., Fort Worth, Tex.

Nebraska State Veterinary Medical Association. Grand Island, Nebr. Dec. 13-14, 1926. Dr. Geo. A. Young, Secretary, Syracuse, Nebr.

Delaware Veterinary Medical Association. Dover, Del. Dec. 17, 1926. Dr. C. C. Palmer, Secretary, University of Delaware, Newark, Del.

American Association for the Advancement of Science. Philadelphia, Pa. Dec. 27, 1926 to Jan. 1, 1927. Dr. Burton E. Livingston, Secretary, Smithsonian Institution Bldg., Washington, D. C.

PUBLICATIONS RECEIVED

Report of the National Research Council for the Year July 1, 1923-June 30, 1924. Washington, D. C., 1925. Vernon Kellogg. pp. 205.

Report of the National Research Council for the Year July 1, 1924-June 30 1925. Washington, D. C., 1926. Vernon Kellogg. pp. 106.

Report of the Imperial Institute of Veterinary Research, Muktesar, for Year ending March 31, 1925. Calcutta, India, 1926. J. T. Edwards. pp. 59.

What Ails Bacterial Counts? Variety of Legal Standards. Archibald R. Ward. Detroit, Mich. Reprint from *Dairy Products Merchandising*, vii (1926), 1. pp. 8.

Market Classes and Grades of Livestock. C. E. Gibbons. (Dept. Bul. 1360, U. S. Dept. Agr. Washington, D. C., June, 1926. pp. 48. Illustrated.)

COMPARATIVE STUDIES ON VESICULAR STOMATITIS AND FOOT-AND-MOUTH DISEASE

By

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Rockefeller Institute for Medical Research, New York, N. Y.,
JACOB TRAUM,
University of California, Berkeley, California,
and
HARRY W. SCHOENING,
*U. S. Bureau of Animal Industry, Washington, D. C.**

INTRODUCTION

The similarity in the clinical picture of vesicular stomatitis and of foot-and-mouth disease, in cattle, is at times strikingly close. The determination of a distinction between the two should be important from the points of view of epidemiology and control. Hence, during the course of the commission's studies on the virus of foot-and-mouth disease, an investigation was made on the comparison of one disease with the other. It was thought advisable to present at this time a preliminary article on the work. The more comprehensive and detailed experiments will be given in the complete report of the commission, to be published later.

In this communication, we shall describe comparative studies on the filtrability of the two viruses; their action in guinea pigs, cattle, swine, and horses; the immunity induced, and the results of cross-immunity tests with the different animals.

EXPERIMENTAL VESICULAR STOMATITIS IN GUINEA PIGS

Waldmann and Pape[1] succeeded in producing experimental foot-and-mouth disease quite regularly in guinea pigs. Their results were amply confirmed by others,[2] including the British[3] and American commissions. The transfer of this virus to guinea pigs is now regarded as an established fact.

Our first experiment in a comparative study of vesicular stomatitis and foot-and-mouth disease began, therefore, with an attempt to transfer the virus of the former to guinea pigs. Portions of the tongue of a horse showing lesions were received,

*The commission appointed by the U. S. Department of Agriculture for the study of foot-and-mouth disease. The work herein reported was done at the Institut d'Hygiène et de Bacteriologie, Strasbourg, France, with the invaluable assistance of Dr. Louis Boëz.

Received for publication, September 2, 1926.

November 18, 1925, from Washington, D. C. This was the only strain of vesicular stomatitis virus available for our work. A salt-solution suspension of this virus, which was sent in 50 per cent glycerol, was applied to the scarified hind pads of three guinea pigs, November 21, 1925. On November 22 all three showed inoculation, or primary, vesicles.* Generalization of the disease, as evidenced by secondary-vesicle formations on the pads of the front limbs of one guinea pig, appeared on November 29. The other two failed to exhibit secondary lesions. Cotton[1] recently reported the transmission of vesicular stomatitis to guinea pigs.

In general, the virus of vesicular stomatitis induced, in guinea pigs, lesions similar to those yielded by that of foot-and-mouth disease. In our experiences with these viruses it was found that as a rule the vesicular stomatitis virus was slower in producing the primary and secondary vesicles. The primary vesicles appeared from the 30th to the 48th hour, and the secondary usually from the 72nd to the 96th hour after inoculation. But this is not a definite distinction between the viruses. For, infrequently, there may be a delay in the appearance of the lesions of foot-and-mouth disease and, occasionally, as after the first inoculation with vesicular stomatitis virus, the primary vesicles may appear within the first twenty-four hours.

In 250 guinea pigs inoculated with vesicular stomatitis virus, one-half the number developed secondary vesicles, while the remainder showed only primary lesions on the inoculated pad. With foot-and-mouth disease virus, on the other hand, the development of the secondary vesicles is the rule. Nevertheless there are some strains of foot-and-mouth disease virus which may also fail to produce "secondaries," especially in early, guinea-pig passages, in a certain, though small, percentage of cases. While there is a difference between the time of the appearance of the lesions and the number of cases in which secondary vesicles develop, it offers no definite points of differentiation of the viruses. The results of the test are shown in table I.

Furthermore, table I indicates that the number of gunea-pig passages had no appreciable effect on the development of secondary lesions.

It is to be noted that the virus was propagated through only thirty guinea-pig passages and that most of the experiments

*The term "primary" vesicle as employed in this paper refers to the vesicle at the site of inoculation and the term "secondary" vesicle refers to generalization of the disease as evidenced by the formation of vesicles at points other than the site of inoculation.

TABLE I—*The effect of guinea-pig passage upon the development of secondary vesicles in vesicular stomatitis*

VESICLE DEVELOPMENT	1ST TO 10TH PASSAGE	11TH TO 20TH PASSAGE	21ST TO 30TH PASSAGE
Guinea pigs developing primary but no secondary vesicles (+P−S)	87	27	11
Guinea pigs developing both primary and secondary vesicles (+P+S)	92	25	8

were made with the virus within the tenth passage. Our impression was that the virus loses its virulence by guinea-pig passage. There was, however, no opportunity to prove this point. Nevertheless, in order to maintain a supply, it was thought desirable to inoculate guinea pigs frequently with material from fresh lesions from larger animals, or with tissue preserved in 50 per cent glycerin solution and kept in the cold chamber.

Of all the guinea pigs inoculated by local application of virus to the skin (injured by scarification or puncture with a fine knife or needle) or by intracutaneous injection, only one animal exhibited a tongue lesion. This, as well, is not a difference between the viruses, since a number of guinea pigs inoculated with some strains of foot-and-mouth disease virus also fail to develop vesicles on the tongue. However, when larger doses of vesicular stomatitis virus were employed, and these were injected either intramuscularly or intradermally in hairy areas, no vesicles developed at the site of inoculation, but, in a considerable number of cases, lesions were noted on the tongue.

Thus of fifteen guinea pigs inoculated intradermally in the abdominal region, six, or 40 per cent, and of fifteen inoculated intramuscularly, three, or 20 per cent, exhibited lesions on the tongue. The erosions following the rupture of the vesicle in these cases were more severe and healed much more slowly than those which occurred after inoculation of the foot-and-mouth disease virus in the pads of the feet. One animal of these series, as a result of intramuscular inoculation, yielded vesicles on two feet as well as on the tongue, while after the intradermal inoculation a single animal developed lesions on the feet only; the other nineteen failed to show any evidence of disease.

From the foregoing, it will be observed that in so far as the effects of injecting the virus of foot-and-mouth disease or of vesicular stomatitis into guinea pigs are concerned, there is little, if any, difference between them.

Cross-Immunity Tests of Vesicular Stomatitis and Foot-and-Mouth Disease in Guinea Pigs

We then attempted to discover any differential factor in the immunity reactions of these two viruses.

Table II, test 1, shows that eighteen guinea pigs which had recovered from vesicular stomatitis failed to yield lesions when again inoculated with vesicular stomatitis virus, while of thirty-one guinea pigs that had recovered from one or more types of foot-and-mouth disease, thirty were susceptible to vesicular stomatitis.

Test 2 shows that when fourteen guinea pigs, recovered from vesicular stomatitis, were inoculated with Type-A foot-and-mouth disease virus, all exhibited primary and secondary vesicles. Moreover, six control animals, recovered from the Type-A virus, revealed no secondary lesions, but in three only mild primary vesicles after reinoculation with the same Type-A virus.

Test 3 reveals that of eleven vesicular-stomatitis convalescents, inoculated with Type-O foot-and-mouth disease virus, all showed primary and secondary vesicles. Of the twelve recovered from Type-O foot-and-mouth disease virus, ten resisted infection with this strain completely, and two developed mild primary but no secondary lesions.*

These series of tests demonstrate definitely that vesicular stomatitis virus can very readily and regularly be distinguished from the two types of foot-and-mouth disease virus by guinea-pig cross-immunity tests, and these therefore should be aids in differentiating the two diseases.

Cross-Immunity Tests with Vesicular Stomatitis and Foot-and-Mouth Disease Immune Sera

The serum of an animal, collected a short time after recovery from foot-and-mouth disease, contains antibodies which can be demonstrated by guinea-pig tests. This is interpreted by the

*Immunity in foot-and-mouth disease may be local and manifest itself by the prevention of primary-vesicle formation at the site of inoculation, or it may be general and prevent the development of secondary lesions. The local immunity is the first to disappear. Thus guinea pigs may still possess immunity against a strain of foot-and-mouth disease virus even though primary inoculation vesicles do occur, provided such guinea pigs are protected from secondary vesicles against a virus which constantly produces secondary lesions. The guinea pigs recorded +P−S with the viruses used are considered immune to that virus. More detailed discussion of immunity will be found in our later report.

TABLE II—*Results of vesicular stomatitis and foot-and-mouth disease guinea-pig cross-immunity tests.*

TEST	GUINEA PIGS IN TEST	FIRST EXPOSURE			SECOND EXPOSURE		
		VIRUS USED*	RESULT†	DAYS BEFORE SECOND EXPOSURE	VIRUS USED	DATE	RESULT
1	18	Vesicular stomatitis	11+P+S 7+P−S	22—25	Vesicular stomatitis	Jan. 15, 1926	18 Negative
	12	Foot-and-mouth O-1	12+P+S	21—54			8+P+S 4+P−S
	11	Foot and mouth A‡	6+P+S 5+P−S	35—54			8+P+S 3+P−S
	3	Foot-and-mouth O-1	3+P+S	92—94			2+P+S
		Foot-and-mouth A	3+P+S	36			1+P−S
	3	Foot-and-mouth A	2+P+S 1+P−S	76—81			1+P+S
		Foot-and-mouth O-1	3+P+S	51			2+P−S
	2	Foot-and-mouth A	2+P+S	74—76			1+P+S
		Foot-and-mouth O-2	2+P+S	46			1 Negative
2	14	Vesicular stomatitis	9+P+S 5+P−S	31—61	Foot-and-mouth A	Jan. 21, 1926	14+P+S
	6	Foot-and-mouth A	4+P+S 2+P−S	43—56			3 M. P.−S 3 Negative
3	11	Vesicular stomatitis	9+P+S 2+P−S	39—66	Foot-and-mouth O-1	Jan. 25, 1926	11+P+S
	12	Foot-and-mouth O-1	12+P+S	29—84			10 Negative 2 M.P.−S

*Vallée and Carré[5] introduced the letters "O" and "A" to designate two types of foot-and-mouth disease viruses. The disease produced by these viruses cannot be distinguished from each other, but one type of virus does not immunize against the other. In these tests one vesicular stomatitis virus, two Type-O and one Type-A foot-and-mouth disease viruses were used.

†+P—S=Development of primary vesicles but no secondary lesions. +P+S=Development of both primary and secondary vesicles.

‡In the early guinea-pig passages with foot-and-mouth disease virus Type-A secondary lesions were not produced regularly.

protective action of the immune serum when injected into guinea pigs which simultaneously receive exposure to virus locally. The serum in certain quantities protects against the generalization of the disease; that is, no secondary lesions are induced.

The serums of animals recovered from vesicular stomatitis possessed this property also. It was found that serum collected from guinea pigs, 12 to 15 days after inoculation, in quantities as small as 0.1 cc, prevented the generalization of the disease. (Smaller quantities were not employed.) Such vesicular stomatitis immune serum, however, had no protective action against the formation of secondary lesions in foot-and-mouth disease, when doses as large as 3 cc were employed (larger doses were not used), and, conversely, foot-and-mouth disease immune serum in doses of 3 cc had no protective action against the formation of secondary lesions in vesicular stomatitis.* This summary shows that the immune serum produced by one virus fails to protect against the other.

Experimental Vesicular Stomatitis in Cattle

Our attention was then directed to a study of the lesions produced in large animals by these viruses.

Vesicular stomatitis, like foot-and-mouth disease, is characterized by the formation of vesicles, on the mucous membrane of the mouth, which are followed by erosions. Before and during the appearance of the vesicles there is a fever. In foot-and-mouth disease, as a rule, the lesions are more extensive and more severe. But in vesicular stomatitis the injury may be so extensive, and in foot-and-mouth disease so mild, that a differential diagnosis becomes extremely hazardous. In the inoculated animals this condition was ofttimes strongly manifest.

Table III shows that forty cattle were exposed to the virus of vesicular stomatitis by one of several modes of injection. The twelve cattle inoculated locally exhibited the disease. The inoculation in each case was made by applying the virus to scarified areas on the upper gum and tongue. Foot lesions were not found in any of the cases so inoculated, nor did we observe definite secondary vesicles in the mouth, although extension from the point of injection was often seen.

Of the fourteen cattle inoculated intramuscularly with 1 to 3 cc of heavy suspensions of virus, none developed definite

*The subject of serum-immunity tests upon guinea pigs is discussed at length in our forthcoming report. Without this discussion, figures which we could present on cross-immunity serum tests would not be complete. We have therefore omitted tables on this phase of the work at this time and merely present conclusions deduced from these experiments.

TABLE III—*Results of cattle inoculations with vesicular stomatitis virus*

SOURCE OF VIRUS	DATE	METHOD OF EXPOSURE								REMARKS
		LOCAL	RESULT	INTRA-MUSCULAR	RESULT	INTRA-VENOUS	RESULT	NATURAL	RESULT	
Horse 1 (vesicle coverings)	2-17-26	4	4 Pos.	4	4 Neg.			6	3 Pos. 3 Neg.*	
Guinea pigs 834 & 835, 837 & 839	3-24-26	2	2 Pos.							
Guinea pigs 821-23, B-75	3-10-26					1	1 Neg.			
Horse 4	3-29-26	2	2 Pos.							
Guinea pigs 849 & 850	3-26-26	1	1 Pos.							
Horse 4	3-29-26	2	2 Pos.							
Heifer 28	3-30-26	1	1 Pos.	2	2 Neg.	7	2 Pos. 5 Neg.			1 positive (foot lesion only)
Guinea pigs 976-981	5-2-26			8	8 Neg.					
Totals		12	12 Pos.	14	14 Neg.	8	6 Neg. 2 Pos.	6	3 Pos. 3 Neg.	

*Record of exposure of three negative cases:

1. Heifer 8 was placed in same stall with heifer 3 on Feb. 17, 1926. On this day heifer 3 was inoculated locally with vesicular stomatitis virus and showed lesions of this disease, Feb. 19, 1926.
2. Heifer 15 was placed in same stall with heifer 5 on Feb. 17, 1926. On this day heifer 5 was inoculated locally with vesicular stomatitis virus and showed lesions of this disease, Feb. 19, 1926.
3. Bull 18 was placed in same stall with heifer 7 on Feb. 19. 1926. Heifer 7 showed first symptoms of vesicular stomatitis on tnat day.

lesions of vesicular stomatitis. One animal so treated showed a series of very superficial liftings of epithelium on the tongue, but two susceptible guinea pigs injected with material obtained on the day of the appearance of the lesions failed to develop the disease. On the other hand, our experience, confirming that of others, with intramuscular inoculations with foot-and-mouth disease virus indicates that this mode is very efficient in producing the disease in cattle.

Eight cattle were inoculated intravenously with a heavy dose of vesicular stomatitis virus. Six remained unaffected, while two developed the disease. Of these two, one showed a mild lesion on one foot only, material from which induced vesicular stomatitis in guinea pigs. The other positive case showed lesions around the nostrils and muzzle. These two animals, due to unavoidable circumstances, were handled by the same attendant in the same stable in adjoining stalls. The location of the lesions on the nostrils and muzzle of the one suggests that the virus may have been transferred by the attendant while holding this animal for examination.

Six animals were exposed by contact to others suffering from the disease. Three contracted the malady and three remained well. As the footnote to table III indicates, the animals were brought together at the time when the lesions first appeared, or before that time. Contact at this time has been found necessary in foot-and-mouth disease, to insure exposure during the infective stage, and this probably applies also to vesicular stomatitis. Hence it may be concluded that the virus of vesicular stomatitis induces lesions indistinguishable from those of foot-and-mouth disease. But a certain difference exists between the effects of the two viruses: Intramuscular or intravenous injection of vesicular stomatitis virus, even with massive doses, failed in our experiments to induce obvious lesions regularly, but the same methods with foot-and-mouth disease virus yielded as a rule the typical vesicles.

Immunity in Cattle Following Exposure to Vesicular Stomatitis Virus

Due to the limited time for our studies, we had no opportunity to observe the duration of immunity in cattle which follows recovery from the disease or from injection of the virus. From the data presented in the preceding pages it is evident that immunity to vesicular stomatitis infection should be based upon

the resistance to local inoculations, since the intramuscular or the intravenous methods of inoculation usually fail to provoke lesions of the disease. The following is a summary of the results of immunity tests in animals which were exposed by different methods to the active agent of vesicular stomatitis.

Three cattle, which recovered from the disease after local inoculation, were proved to be resistant when given subsequent similar injection.

Six cattle received the first inoculation intramuscularly with negative results. Subsequently four received a local injection; of these, three were immune and one developed the disease. The second inoculation in the positive case was made only five days after the first. The remaining two cattle in this group were given a second injection by the intravenous method with negative results. Hence, no conclusions could be drawn as to their immunity, for this method may fail to reveal obvious lesions.

Six cattle inoculated intravenously, with negative results, were given a second exposure to the virus by local inoculation. All six proved to be resistant.

Six cattle were first exposed to vesicular stomatitis by being brought into contact with infected cattle. Three animals developed the disease. The three unaffected ones were given a second injection by the intravenous method and therefore yielded no evidence upon which to draw conclusions as to their immunity.

These results indicate that immunity in vesicular stomatitis in cattle is rather easily induced. It is important to note that resistance follows intramuscular or intravenous injection of virus, though no visible lesions are produced.

Cross-Immunity Tests of Vesicular Stomatitis and Foot-and-Mouth Disease in Cattle

The immunity in cattle following exposure to the virus of vesicular stomatitis has just been demonstrated. On the other hand, animals recovered from foot-and-mouth disease are resistant to reinfection with the same type of foot-and-mouth disease virus for varying periods of time. In the following are reported cross-immunity tests:

Twenty-six cattle, which had either recovered from vesicular stomatitis or had been inoculated intravenously or intramuscularly with the active agents of this disease, were exposed to foot-and-mouth disease virus. Fifteen of the twenty-six

were exposed by local application of either Type-O or Type-A virus to the scarified mucous membrane of the mouth or by intramuscular injection. All exhibited experimental foot-and-mouth disease. The remaining eleven were exposed by contact to Type-O foot-and-mouth disease virus. Seven of these developed the disease while four remained apparently normal. Of seven normal animals used as controls in this test, four exhibited the disease and three were still negative when we were compelled to terminate the experiment.

Nine cattle which recovered from one or both types of foot-and-mouth disease were exposed to vesicular stomatitis virus. Five of these were given a local inoculation, and all revealed the disease. The other four were placed in contact with vesicular-stomatitis-infected cattle. Two of these developed the disease while the other two remained well.

These tests bring forth results similar to those obtained in the guinea-pig cross-immunity tests, namely, that animals recovered from vesicular stomatitis are susceptible to either type of foot-and-mouth disease and, conversely, animals recovered from either or both types of foot-and-mouth disease can be readily infected with vesicular stomatitis virus.

Experimental Vesicular Stomatitis in Swine

Mohler[6] reported the transference of vesicular stomatitis to three hogs by local inoculation. Our experience confirms this finding, as the following shows: Of eight hogs exposed to the virus of vesicular stomatitis, by local or intravenous inoculations, six revealed the disease. The disease produced by intravenous inoculations was clinically indistinguishable from foot-and-mouth disease in swine.

The injected animal shows, after 24 to 48 hours, a marked rise in temperature. Usually, in 48 hours, distinct vesicles make their appearance on the feet, involving the interdigital space, the coronary band and the heels, extending in some instances to the plantar surfaces of the feet. In some cases the dewclaws are also involved. The animals become very lame and move about with difficulty, often walking on their knees, as is seen in foot-and-mouth disease. Vesicle formation may also occur on the snout. The animals are quite sick and as a rule do not eat for several days. Within a few days the temperature drops to normal, the animals begin to eat, the feet become less sensitive, and healing gradually takes place. After a few weeks a

distinct line of separation between the new and old horn can be seen clearly on the affected feet. These processes are identical with those of foot-and-mouth disease.

As a result of local inoculations, swine show a vesicle at the site of inoculation and, following its rupture, an erosion occurs with a raw, red base. The local lesions appear to be more pronounced than the lesions seen in foot-and-mouth disease, following the same method of inoculation. A marked rise in temperature is coincident with the appearance of the local lesion, or it may take place later. In the three animals inoculated in this way no secondary lesions could be seen. In foot-and-mouth disease, as a rule, secondary lesions are noted following local inoculations. Only three hogs, however, were inoculated locally with vesicular stomatitis virus. This number is, of course, too small to be of any value upon which to establish points of difference between the two diseases.

Two hogs (4 and 7, table IV) were exposed to natural infection by placing them in contact with hogs artificially infected and in the same pens. The animals were together from the time the latter were injected. Neither of the two exposed animals exhibited the disease. Hog 4 was resistant to two later inoculations, one intravenous and one local, while hog 7 was proved to be susceptible by reacting to a later local injection of active virus. Thus it appears that swine are susceptible to vesicular stomatitis and react with lesions similar to those of foot-and-mouth disease.

Cross-Immunity Tests with Vesicular Stomatitis and Foot-and-Mouth Disease in Swine

Cross-immunity tests in swine demonstrated, as in similar tests in guinea pigs and cattle, that animals recovered from foot-and-mouth disease were susceptible in general to infection with vesicular stomatitis and that hogs recovered from vesicular stomatitis were readily infected with Type O of foot-and-mouth disease virus. Type-A virus was not used.

Table IV shows that of eight hogs recovered from one or both types of foot-and-mouth disease and then inoculated locally or intravenously with vesicular stomatitis virus, all revealed clear-cut evidence of the latter disease, excepting hogs 5 and 6. Hog 5, as a result of an intravenous inoculation, showed a questionable lesion of the disease on one foot only. This animal was, however, resistant to a subsequent intravenous injection. Hog 6 failed

to show any evidence of disease following an intravenous inoculation. It was later found resistant to one intravenous and one local inoculation. Hog 4 recovered from foot-and-mouth disease, was exposed by contact to the vesicular stomatitis virus, but failed to show any evidence of disease. It was resistant to later inoculations, two intravenous and one local, of active vesicular stomatitis virus.

TABLE IV—*Results of cross-immunity tests in swine with foot-and-mouth disease and vesicular stomatitis*

HOG	VIRUS IMMUNE TO—	VIRUS EXPOSED TO—	METHOD OF EXPOSURE	RESULT
1	Foot-and-mouth O and A*	Vesicular stomatitis	Local	+
2	Foot-and-mouth O and A	do	Intravenous	+
3	Foot-and-mouth O and A	do	do	+
4	Foot-and-mouth O and A	do	Natural Intravenous and Local	— — —
5	Foot-and-mouth O and A	do	Intravenous do	? —
6	Foot-and-mouth A	do	do do Local	— — —
7	Foot-and-mouth A	do	Natural Local	— +
8	Foot-and-mouth O and A	do	do	+
9	Foot-and-mouth A	do	Intravenous	+
10	Vesicular stomatitis	Foot-and-mouth O	do	+
11	do	do	do	+

*Two types of foot-and-mouth disease virus, O and A.

Two hogs (10 and 11, table IV), recovered from vesicular stomatitis, revealed foot-and-mouth disease following an intravenous inoculation of the latter virus. It is to be noted, then, that cross-immunity between the two viruses does not exist in this species.

EXPERIMENTAL VESICULAR STOMATITIS IN HORSES

Five horses were inoculated locally with vesicular stomatitis virus, as follows: A small portion of the dorsal surface of the tongue and a portion of either the upper gum or inner surface of

the lip were scarified. Vesicular fluid and epithelial coverings from either guinea pigs or cattle lesions were then applied to these scarified areas. Four of these horses developed severe lesions at the site of inoculation on the tongue. The fifth failed to show evidence of disease at the points of inoculation. It did, however, reveal a temperature of 104.8° F. on the fourth day. Five days after inoculation, this horse was killed while in the agonal stage of meningitis. The cause of the meningitis was not determined.

In general, the appearance of the experimental disease in the horse is as follows: From 36 to 72 hours after injection the tongue shows, at the site of inoculation, blanched, easily-detachable areas which soon fill with clear, straw-colored fluid. These coalesce, forming a large vesicle containing as much as 5 to 10 cc of fluid. Within the next 24 hours the vesicle ruptures, leaving a deep, red, raw erosion, which heals very slowly. Definite secondary lesions have not been observed, although we have seen extension of lesions beyond the points of inoculation.

The lesions at the other points of inoculation, such as on the gum and on the lip, are mild, and limited to small vesicle-formations, followed by erosions which heal rapidly. In one of the four cases no definite lesions developed in any other site than on the tongue. In the horse the tongue appears to be a more suitable place for inoculation of vesicular stomatitis virus than other parts of the buccal mucosa. Such was not our experience in cattle. In cattle there seemed to be no marked difference between the severity of the lesions produced on the tongue and those on other portions of the mucous membrane of the mouth.

Six horses were inoculated, locally or intramuscularly, with one or more types of foot-and-mouth disease virus. These inoculations failed in every case to produce any evidence of disease. The literature contains references to rare instances of natural and experimentally-produced cases of foot-and-mouth disease in horses. However, none of these instances can be regarded as clear-cut and unequivocal. The horse is still the animal upon which most reliance can be placed in differentiating vesicular stomatitis from foot-and-mouth disease.

Filtration Experiments

It is generally accepted that the virus of foot-and-mouth disease is filtrable. The members of the commission, in more extensive observations, found that the virus ordinarily carries

an electro-positive charge—its iso-electric range centering at pH = about 8 – and that this condition influences filtration through the commonly-employed electro-negative filters. To summarize the results of the commission's experiments: The foot-and-mouth disease virus, in its electro-positive condition, is filtrable through the Seitz asbestos disc, through Berkefeld V and N candles, and through the various sizes of Chamberland bougies up to LII. With respect to the LII filter, electro-positive virus failed to traverse this type of Chamberland bougie, but when the charge of the virus was shifted to electro-negative it then passed freely through this same filter.

On the other hand, the virus of vesicular stomatitis was regarded, at the inception of the commission's studies on its filtration in November, 1925, as non-filtrable. Mohler,[6] in 1918, and Cotton,[4] in 1926, reported that the virus failed to pass filters which retain bacteria of the ordinary species such as *B. prodigiosus*.

In the following are reported the results of eighteen different filtration tests from thirteen of which an unequivocal conclusion can be drawn that the virus of vesicular stomatitis is also filtrable and that a distinction between this virus and that of foot-and-mouth disease on the basis of filtrability does not exist.

The first test was made, November 30, 1925, with a Berkefeld V filter.

Protocol I: A new Berkefeld filter, type V, was employed with a negative pressure of 20 cm. Hg. A vigorously-growing culture of *B. prodigiosus* was first filtered, with the result that the material before filtration yielded a profuse growth but the filtrate remained sterile. Then the aspirated lymph from six guinea pigs with experimental vesicular stomatitis was diluted 1:8 in physiological saline at pH = 7.6 and filtered through the same candle. Two guinea pigs were injected intradermally in the posterior pads with the filtrate and four with the unfiltered materials. All six exhibited the typical lesions of vesicular stomatitis within 48 hours.

Thus, in a carefully controlled filtration experiment, it was found that the virus of vesicular stomatitis was filtrable through a Berkefeld V candle. This experiment was repeated under exactly similar conditions except that the virus material was diluted 1:15 in physiological saline at pH = 7.8. In this case four guinea pigs were injected, two with the unfiltered and two with the filtered substance. All showed typical vesicular stoma-

titis lesions within 48 hours. Another repetition was made with the virus diluted 1:25 in the saline. Here again the two guinea pigs injected with the unfiltered and the two with the filtered material yielded typical experimental vesicular stomatitis within 48 hours. A fourth test was made with the aspirated lymph diluted 1:20 in phosphate buffer at pH = 7.5. The other conditions of the experiment remained the same. Three guinea pigs injected with the unfiltered and three with the filtered virus showed the typical vesicles of vesicular stomatitis within 48 hours.

Hence, in four different tests, in which active virus was used from different sources, and diluted from 1:8 to 1:25, either in physiological saline or phosphate buffer at pH = 7.5 to 7.8, filtration was effected through an equal number of new Berkefeld V candles, impervious to a culture of *B. prodigiosus.*

The next experiments concerned the filtrability of the virus through Berkefeld N candles, which are less porous than the V type.

Protocol II: In all, ten different filtration tests were made, employing a new Berkefeld N filter in each instance. These filters were all tested for absence of leakage with *B. prodigiosus* cultures and in every case the unfiltered culture grew profusely but the filtered material remained sterile. A negative pressure of 20 cm. Hg. was used throughout these tests. The sources of the virus were the vesicular fluid or finely-ground tissue covering the vesicles from the tongue of a heifer and of four different horses. In addition there was employed the vesicular fluid from the foot lesions of a hog and those of three guinea pigs. The diluents were either physiological saline solution or phosphate buffer at pH = 7.5 to 7.6 and the dilutions of the virus materials in them were from 1:10 to 1:150. In each experiment, as a control, the unfiltered, diluted virus was injected into two guinea pigs which showed, within 48 hours, as a rule, the typical vesicles of vesicular stomatitis. The filtrate was injected intradermally in the posterior pads of from two to three guinea pigs for each test. The results of the inoculation of filtrates are given in table V.

This series of ten separate filtration tests, made with active virus diluted 1:10 to 1:150, and obtained from different sources, shows that the active agent was also filtrable through Berkefeld N candles which were impermeable to *B. prodigiosus.* In four

TABLE V—*Results of inoculation of filtrates*

TEST	SOURCE OF MATERIAL AND DILUTION	INJECTION OF FILTRATE IN GUINEA PIGS
1	Tongue vesicle, horse (1:25)	Positive
2	Foot vesicle, guinea pig (1:10)	Positive
3	Tongue vesicle, horse (1:10)	Negative
4	Foot vesicle, hog (1:15)	Negative
5	Foot vesicle, guinea pig (1:40)	Negative
6	Foot vesicle, guinea pig (1:40)	Negative
7	Tongue vesicle, horse (1:20)	Positive
8	Tongue vesicle, horse (1:150)	Positive
9	Tongue vesicle, heifer (1:20)	Positive
10	Tongue vesicle, heifer (1:20)	Positive

of the ten experiments, the virus, however, failed to traverse these filters.

Filtration of the virus through a Seitz filter was then attempted. The Mantenfel, E. K. model with one asbestos disc, was used at a negative pressure of 20 cm. Hg. The virus comprised the fluid and ground coverings of a vesicle on the tongue of a horse, diluted 1:150 in phosphate buffer at pH = 7.5. Both the unfiltered and filtered material could induce experimental vesicular stomatitis in guinea pigs.

Finally, filtrations were made through Chamberland bougies, sizes L3, L7 and L11,* all of which were proved impermeable to living *B. prodigiosus* cultures.

Protocol III: Single experiments were made with each of the L3, L7, and L11 types of Chamberland filters. No negative or positive pressure was applied, but the virus materials were allowed to drip through the walls for about one hour. The virus consisted of the fluid or ground coverings of vesicles on the tongues of two horses with vesicular stomatitis, diluted about 1:20 in phosphate buffer at pH = 7.5 to 7.6.

The unfiltered material from each horse was injected in three guinea pigs, or six in all. These six showed the typical vesicles of vesicular stomatitis within 48 hours after injection

The filtrate of the L3-type bougie was inoculated into three guinea pigs. One showed primary and secondary vesicles; the other two were apparently unaffected. But a reinoculation of one of the negative guinea pigs with active virus, fifteen days later, again revealed no symptoms. Hence lesions may have been

*An L5-type filter was also employed, but it was found to contain Javelle water (a chlorin compound) with which this filter was cleaned. The negative results in this case, therefore, could not be considered as conclusive.

present after the first injection but were probably so slight as to be masked or overlooked. The other negative pig died.

The filtrate of the L7-type bougie was inoculated into three guinea pigs. One exhibited the typical disease which could be transferred to a normal animal, but the second and third were negative. On reinoculation with active virus, fourteen days later, one of the latter two was positive, the other negative. It is apparent that here again the symptoms after the first injection may have been overlooked in one of these animals.

The filtrate of the L11-type bougie was injected into three guinea pigs. All remained well and a reinoculation of active virus, after fourteen days, induced in these three animals the typical primary and secondary vesicles of vesicular stomatitis.

This experiment demonstrates that the virus can traverse the L3 and L7 types of Chamberland filters but not the L11. In this respect an analogue is to be found in the similar behavior of the foot-and-mouth disease virus—a condition to be discussed later. It is noteworthy that no pressure, positive or negative, was employed in the experiment and that the filters were capable of retaining *B. prodigiosus*.

Table VI summarizes the results of the eighteen separate filtration tests.

TABLE VI—*Results of filtration of the virus of vesicular stomatitis*

TYPE OF FILTER USED	NUMBER OF SEPARATE FILTRATIONS	NUMBER OF FILTRATES CONTAINING VIRUS
Berkefeld V	4	4 positive
Berkefeld N	10	6 positive; 4 negative
Seitz	1	1 positive
Chamberland L3	1	1 positive
Chamberland L7	1	1 positive
Chamberland L11	1	1 negative

To prove the specificity of the virus contained in the vesicular stomatitis filtrates, a cross-immunity test was made in which a Berkefeld-N filtrate of the virus was injected into three guinea pigs recovered from vesicular stomatitis; into three having had a Type-A foot-and-mouth disease, and into a like number of animals convalescent from Type-O foot-and-mouth disease. The results of this test showed that the filtered vesicular stomatitis virus induced the typical experimental disease in recovered Type-A and Type-O foot-and-mouth disease guinea pigs, as well as in

the normal controls, but was without effect in the animals which had been through an attack of vesicular stomatitis.

Discussion

In the comparative studies of foot-and-mouth disease and vesicular stomatitis, our efforts were directed to find criteria by which one could be differentiated from the other.

That the vesicular stomatitis virus produces lesions in the guinea pig has been shown. In general these lesions are indistinguishable from those of experimental foot-and-mouth disease. It has been pointed out that as a rule the vesicular stomatitis virus requires a longer time to exhibit vesicles than does the foot-and-mouth virus. Furthermore, secondary vesicles were not so constantly present in experimental vesicular stomatitis in guinea pigs. These findings were not constant for the virus of either disease and can not be relied upon as a criterion for differentiating the two diseases by guinea-pig inoculations.

The cross-immunity tests in guinea pigs, however, indicate definitely that one disease does not immunize against the other. Hence this can be used in supplementing other means of differentiating vesicular stomatitis from foot-and-mouth disease. For example, a supply of guinea pigs recovered from or immunized against vesicular stomatitis can be kept constantly on hand by the Bureau of Animal Industry. Suspected material is then inoculated into a series of five or more vesicular-stomatitis-immune guinea pigs and also into two or three normal guinea pigs. If the suspected material induces lesions in the normal guinea pigs and not in the vesicular-stomatitis-immunes, it would be proof that the inoculated material contained vesicular stomatitis virus. On the other hand, if both the control normal guinea pigs and the vesicular-stomatitis-immunes became infected, it would indicate that the suspected material contained foot-and-mouth disease virus.

Two types (A and O) of foot-and-mouth disease virus have been briefly referred to. Neither of these viruses immunizes against the other. Whether or not more than one type of vesicular stomatitis virus exists is not known at present, but such a possibility should, however, be borne in mind when interpreting results of guinea-pig inoculations where vesicular-stomatitis-immune animals show lesions. It is not possible under existing conditions in America to have a supply of foot-and-mouth-disease-immune guinea pigs to complete these cross-immunity tests.

The use of foot-and-mouth-disease- and vesicular-stomatitis-immune sera in guinea pig tests for differentiating the two diseases also suggests itself.

Cross-immunity experiments with cattle yielded practically the same results as those in guinea pigs. It is apparent, however, that unless cattle immune to vesicular stomatitis are by chance available, the constant regular supply of immunized guinea pigs is more economical and quite as effective.

The cattle inoculations, however, yield differences, which, if carefully considered, may be of considerable aid in differentiating the two diseases. It has been pointed out that definite lesions of vesicular stomatitis were not observed in cattle inoculated intramuscularly with as much as 1 to 3 cc of heavy suspensions of vesicular stomatitis virus. On the other hand, with foot-and-mouth disease virus, this mode of inoculation induced typical, pronounced lesions in all eleven cattle injected. Other investigators also report positive results with intramuscular injection of foot-and-mouth disease virus.

The intravenous inoculation of vesicular stomatitis virus into seven cattle resulted in one animal showing a definite but mild affection. We did not inoculate foot-and-mouth disease virus into cattle by the intravenous route. Others, however, report positive results by that method.

Even with local inoculation there is almost always a difference in the behavior of the two viruses. When cattle were inoculated on the tongue or gums with vesicular stomatitis virus, no foot or other secondary lesions were observed. With foot-and-mouth disease virus, the local inoculation, as a rule, causes foot and other secondary lesions.

For proper interpretation of the inoculation results it is essential that the injected material, either from foot-and-mouth disease or from vesicular stomatitis suspects, should contain fluid or coverings from fresh, or recently-ruptured, vesicles. Under certain conditions the virus loses its virulence rapidly.

Hogs appear to be at least as susceptible to vesicular stomatitis as to foot-and-mouth disease virus, when inoculated locally or intravenously, and offer no means of differentiating the two diseases. Cross-immunity tests, however, reveal a sharp difference, but here there is no advantage over guinea pigs for differential tests.

The horse is the most reliable animal for distinguishing the two diseases. While this animal is readily infected with vesicular

stomatitis virus, we have been unable to infect it with either type of foot-and-mouth disease virus. The failure to affect the horse by inoculation of foot-and- mouth disease virus, together with field experiences in foot-and-mouth disease in this and other countries, may be accepted as evidence of the resistance of this animal to that disease, in spite of the few indefinite cases to the contrary found in the literature.

It was demonstrated that cattle are readily immunized against vesicular stomatitis by local, intramuscular, or intravenous inoculation of the virus, even though no evidence of the disease is observed. By analogy to the immunity produced in certain other diseases, it was hoped that this strong, easily-produced immunity in vesicular stomatitis would also protect against foot-and-mouth disease infection. A large series of cross-immunity tests proved, however, that cattle recovered from vesicular stomatitis become infected when exposed to foot-and-mouth disease virus either by contact, by local, or by intramuscular inoculations of the virus.

In respect to filtration, there is no distinction between the virus of vesicular stomatitis and that of foot-and-mouth disease. Both respond to the test in a fairly parallel manner. It appears that the virus of vesicular stomatitis has a tendency to become adsorbed in the walls of the denser types of filters, as in the case of the Berkefeld N, and the L11 type of the Chamberland. With the foot-and-mouth disease virus this condition also prevails and has been found to be a consequence of its electro-positive charge. No cataphoresis tests were made, however, with the active agent of vesicular stomatitis, so that a definite interpretation of this phenomenon is not possible. The results of the experiments are suggestive, however, if such adsorption occurs as a consequence of electro-positive charge, that the virus of vesicular stomatitis may be of the order of magnitude of that of foot-and-mouth disease.

CONCLUSIONS

From the foregoing work the following conclusions may be drawn:

1. Vesicular stomatitis virus is readily transferred to guinea pigs. There is little to differentiate this disease from foot-and-mouth disease by a study of the lesions induced. Cross-immunity tests in these animals, however, demonstrate that vesicular

stomatitis virus can be distinguished readily and definitely from foot-and-mouth disease virus. This, therefore, offers an aid in differentiating the two diseases.

2. Vesicular stomatitis virus induces lesions in cattle which are at times indistinguishable from those of foot-and-mouth disease. Differences were noted, however, in the response to various methods of inoculation of the two viruses. Divergence in the course of the two diseases was also observed. Immunity produced in cattle by vesicular stomatitis and foot-and-mouth disease is solid for its respective virus, but in the considerable number of cattle inoculated with, or exposed by contact to, the two viruses, no evidence of cross immunity was found.

3. Swine are susceptible to the active agent of vesicular stomatitis; the disease induced is then indistinguishable from foot-and-mouth disease. However, no evidence of cross immunity between the two was discovered.

4. Horses are very sensitive to infection with vesicular stomstitis virus by inoculation on the tongue. On the other hand, these animals are resistant to foot-and-mouth disease when inoculated on the tongue, mucous membrane of the lips, or intramuscularly. The horse can be regarded as the best test animal to differentiate vesicular stomatitis from foot-and-mouth disease.

5. In thirteen of eighteen carefully controlled filtration experiments it was found that the virus of vesicular stomatitis was filtrable through Berkefeld V and N candles, through Seitz asbestos discs, and through Chamberland bougies, sizes L3 and L7. The virus, similar to that of foot-and-mouth disease, is not filtrable under ordinary conditions through Chamberland L11-type bougies and shows the same tendency to adsorption in the walls of denser electro-negative filters.

REFERENCES

[1]Waldmann, O., & Pape, J.: Berl. Tierärzt. Wochnschr., xxxvi (1920), 29, p. 519.
[2]Gins, H. A., & Krouse, C.: Ergeb. Allgem. Path. Lubarsch and Ostertag., xx (1924), II Abt., II Teil., p. 805.
[3]First Progress Report of the Foot-and-Mouth Disease Research Committee, Ministry of Agriculture and Fisheries, London, 1925.
[4]Cotton, W. E.: Vesicular stomatitis in its relation to the diagnosis of foot-and-mouth disease. Jour. A. V. M. A., lxix (1926), n. s. 22 (3), pp. 313-332.
[5]Vallée, H., & Carré, H.: Comptes rendus de l'Academie de Sciences, clxxiv (1922), 3, p. 207.
[6]Mohler, J. R.: Vesicular stomatitis of horses and cattle. Jour. A. V. M. A., li (1918), n. s. 5 (4), pp. 410-422.

Thirty-four agricultural colleges report an average falling-off of 35 per cent in their enrollments, during the past ten years. In 1914 the University of Illinois had 1,171 students; in 1924, 641. The University of Wisconsin reports even a greater reduction.

THE CAUSAL AGENT OF VESICULAR STOMATITIS PROVED TO BE A FILTER-PASSING VIRUS

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Work done in the Bureau several years ago and the more recent work of last year failed to prove that the virus of vesicular stomatitis would pass through bacteria-retaining filters. Efforts to cultivate the organism which caused the disease, however, were unsuccessful. Experiments in centrifugalization, using diluted, defibrinated, infectious blood, did not show a greater concentration of the virus in the corpuscular sediment than in the supernatant serum. These results, together with recent observations indicating that the virus in order to infect large animals must be in considerable concentration, lead to the belief that former failures to prove the virus to be a filter-passer may have been due to the use of insufficient infectious material and test animals not sufficiently sensitive to detect virus in the high dilutions necessary to be made in order to filter the material. The discovery that the guinea pig is susceptible and more sensitive to the virus than large animals placed in our hands a much more delicate means of detecting virus that might pass through filters, and encouraged further work in filtration.*

FIRST EXPERIMENT

All of the recent filtration experiments at the Station have been made with one strain of virus, obtained from an outbreak of vesicular stomatitis near Richmond, Ind., in May, 1925. The first experiments were negative, probably for the reasons mentioned above. The first experiment giving positive results was made as follows: On March 25, 1926, a dilute emulsion of infectious material, collected from cows 518 and 1253 on March 18, was prepared. These cows had developed well-marked and typical vesicles on their tongues as a result of local inoculations 42 hours previously. The material was collected from fresh vesicles, was kept in the ice-box until used, and consisted of

*Since this paper was written, Doctors Schoening and Traum informed me that the commission, of which they were members, sent to Europe by the Department of Agriculture to study foot-and-mouth disease, succeeded in passing the virus of vesicular stomatitis through Berkefeld filters V and N, the coarsest and medium grades, and Chamberland L, 3, 5 and 7, in sufficient concentration to infect guinea pigs. Larger animals were not used.

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2½ grams of detached epithelium from the tongue of each of the cows, approximately 1¼ cc of vesicular fluid from cow 1253, and a quantity of saliva, absorbed by cotton swabs, from the mouths of both. The epithelium was ground to a fine pulp in a mortar; the saliva was washed out of the swabs with 0.85 per cent salt solution, mixed with the ground epithelium and vesicular fluid, and made up to 300 cc after it had been passed through filter paper. Two-thirds of the growth from two well-grown slants of abortion bacilli, suspended in 20 cc of 0.85 per cent salt solution, was then mixed with the emulsion. Two-thirds of the emulsion was then passed through a Berkefeld preliminary filter and then through a Berkefeld V filter, the latter being the coarsest of the three grades of bacteria-retaining filters of this type on the market. The preliminary filter was used simply to facilitate filtration through the finer filter. The material in this and the succeeding experiments was filtered under 6½ inches vacuum.

Check cultures were inoculated as follows and kept under favorable conditions for the growth of *B. abortus*, the organism used to check the filter:

3 potato-agar slants, each with 3 loops of the suspension of *B. abortus* that was added to the emulsion.
4 potato-agar slants, each with ⅓ cc V filtrate.
2 potato-agar slants, each with ½ cc V filtrate.

Animals were then inoculated with the V filtrate as follows:

Horse 280 received 20 cc intravenously and in addition two areas on the tongue were scarified and the filtrate rubbed in.
6 guinea pigs, each injected with 2 drops, subcutaneously, at side of either metatarsal pad.
4 guinea pigs, each inoculated cutaneously, on one of the metatarsal pads.

Inoculations were made from the portion of the emulsion left unfiltered as follows:

Horse 277, injected intravenously with 10 cc and, in addition, the emulsion rubbed into scarification on tongue.
6 guinea pigs, each injected with 2 drops, subcutaneously, at side of each metatarsal pad.
4 guinea pigs, each inoculated cutaneously, on one of the metatarsal pads.

Results

Horse 280 (filtrate): No lesions developed. Temperature remained normal. This horse was reinoculated on tongue with fresh saliva, from horse 276, collected at time of rupturing of vesicles, May 19, but disease again failed to develop. Two heifers inoculated with the same material at the same time developed typical vesicles in regular time.

All of the six guinea pigs injected subcutaneously and one of the four inoculated cutaneously with the filtrate developed typical lesions of vesicular stomatitis.

Horse 277 (unfiltered material): Developed typical lesions of vesicular stomatitis on the second day after inoculation, with additional vesicles on the following day.

All of the guinea pigs inoculated with the unfiltered emulsion developed lesions of the disease.

Thus, in this experiment, the virus was shown to pass through a Berkefeld V filter which kept back *B. abortus;* but the virus, while sufficiently concentrated to cause vesicles to develop in seven of the twelve guinea pigs inoculated with it, did not cause manifest disease in the horse, though it evidently did cause a very mild form of the disease, as is shown by the animal resisting an inoculation, nearly two months later, with material that caused well-marked disease in two fresh cattle inoculated with it.

Second Experiment

On April 6, 1926, an emulsion of vesicular stomatitis material was prepared as follows:

Five grams of epithelium from the tongue of cow 1227 and 10 grams from the tongue of cow 1142, both collected from freshly-formed vesicles on April 2 and since then kept in the ice-box, were ground to a fine pulp in a mortar. To this were added 5 cc of saliva and 1 cc of vesicular fluid from cow 1227, 25 cc of saliva and 2 cc of vesicular fluid from cow 1142, and 500 cc of 0.85 per cent salt solution. The emulsion was then filtered through filter paper and a portion of it set aside for the inoculation of positive checks. To the remainder was added 13 cc of a very cloudy suspension of *B. abortus* and the same amount of a like suspension of *B. prodigiosus.* The abortion suspension was prepared by washing the growth from the surfaces of two well-grown potato-agar slants of this organism of 13-day growth, with 17 cc of 0.85 per cent salt solution. The suspension of *B. prodigiosus* was prepared in the same manner from two well-grown agar slants, grown 24 hours at room temperature. These suspensions were thoroughly mixed with the emulsion and the whole passed through a Berkefeld preliminary filter. The filtrate was divided into two unequal portions. The larger of these was passed through a V Berkefeld filter and the smaller through an N, or medium-grade, Berkefeld filter.

Check cultures were inoculated as follows:

3 potato-agar slants, each with 3 loops of the *B. abortus* suspension that was added to the emulsion.
3 potato-agar slants, in same manner with the suspension of *B. prodigiosus.*
4 potato-agar slants, each with ½ cc of unfiltered emulsion.
6 potato-agar slants, each with ½ cc of preliminary filtrate.
8 potato-agar slants, each with ½ cc of V filtrate.
6 potato-agar slants, each with ½ cc of N filtrate.

Cultures from each of these lots were kept under conditions favorable to the growth of *B. abortus,* under ordinary incubator conditions and at room temperature.

Animal Inoculations

N filtrate: As only a limited quantity of N filtrate was obtained, inoculations of this filtrate were confined to guinea pigs only, as follows:

6 guinea pigs, cutaneously, right metatarsal pad.
6 guinea pigs, subcutaneously, both metatarsal pads, each with two drops at each point.
6 guinea pigs, intra-abdominally, each with 2 cc.

V filtrate: Heifer 1248 was injected intravenously with 40 cc of the V filtrate and a portion of it rubbed into fresh scarifications on her tongue.

Guinea pigs were inoculated with the V filtrate as follows:

6 guinea pigs, cutaneously, right metatarsal pad.
6 guinea pigs, subcutaneously, both metatarsal pads, each with two drops at each point.
6 guinea pigs, intra-abdominally, each with 3 cc.
6 guinea pigs, subcutaneously, both metatarsal pads, each with two drops at each point, 24 hours after the preceding guinea pigs were inoculated.

Unfiltered emulsion: Bull 1250, injected intravenously, with 12 cc of the unfiltered emulsion and a portion of it rubbed into fresh scarifications on his tongue.

Guinea pigs were inoculated with the unfiltered material as follows:

6 guinea pigs, cutaneously, right metatarsal pad.
6 guinea pigs, subcutaneously, both metatarsal pads, each with two drops at each point.

Results

N filtrate: Five of the six guinea pigs inoculated cutaneously and two of those inoculated subcutaneously with the filtrate developed typical lesions of vesicular stomatitis, while none of the intra-abdominally-injected developed manifest disease, yet they probably had mild attacks, as is evinced by the resistance shown to inoculations made three weeks later, which caused marked lesions in all of twelve check guinea pigs inoculated, but caused a visible lesion in only one of the filtrate guinea

pigs, and this was a very small one and was a day late in appearing.

V filtrate: Heifer 1248 did not develop lesions and her temperature remained normal. She was inoculated again, eleven days later, with material that promptly brought down a horse and two mules. She developed well-marked lesions of the disease, but the vesicles were about 24 hours late in appearing.

Five of the six guinea pigs inoculated cutaneously, four of the six injected subcutaneously the day the filtrate was prepared, and two of the six injected in the same manner on the following day with the V filtrate developed typical lesions of vesicular stomatitis. Though the intra-abdominally-injected guinea pigs did not develop manifest lesions, they probably had the disease in a mild form, as they all resisted an inoculation three weeks later, with material that caused well-marked disease in all the twelve check guinea pigs inoculated with it. Three of the guinea pigs receiving the day-old filtrate, which failed to show lesions, also failed to develop lesions when inoculated with material which caused well-marked lesions in two check guinea pigs.

Unfiltered emulsion: Bull 1250 developed typical vesicles around the site of inoculation on the second day, and two days later a very large vesicle, covering the entire interdigital space of one hind foot, and smaller ones on both bulbs of the heel of this foot appeared. The vesicle in the interdigital space ruptured while being examined and discharged a considerable quantity of watery fluid. The lesions were indistinguishable from those of foot-and-mouth disease. The animal was noticeably lame on the affected foot. Two days later the foot was very sore and the claws had loosened for a considerable distance at the heel. The foot healed without complications, but several days were required for it to do so. In our experience, this is the first case in which foot lesions have appeared as a result of inoculation, other than a local one, in the foot.

All of the guinea pigs receiving this unfiltered emulsion developed well-marked, typical lesions of vesicular stomatitis.

The check cultures on the suspensions, unfiltered emulsion, and filtrates, were examined as follows:

April 9th, three days after inoculation.

Those grown under conditions favorable to B. abortus:

3 slants from *B. abortus* suspension all show typical growths covering entire surface of slants.

1 slant from unfiltered emulsion shows growth of *B. abortus* and contaminating organisms.

2 slants from preliminary filter filtrate: one remained sterile; the other two shows scattering colonies, mostly other than *B. abortus*.
4 slants from V filtrate: no growth.
2 slants from N filtrate: no growth.

Those grown in incubator under ordinary conditions:

1 slant from *B. prodigiosus* shows growth covering entire slant.
1 slant from unfiltered emulsion shows gas-producing organism growing.
2 slants from preliminary filter filtrate: about a dozen colonies sprinkled over surface of each.
2 slants from V filtrate: no growth.
2 slants from N filtrate: no growth.

Those kept at room temperature:

2 slants from *B. prodigiosus* suspension: very dense, dark-pink growth, covering entire slant.
2 slants from unfiltered emulsion: dense growth *B. prodigiosus* and gas-producing contaminations.
2 slants from preliminary filtrate: entire surface of each sprinkled with about 75 pink colonies and, in addition, one contains a gas-producing organism.
2 slants from V filtrate: no growth.
2 slants from N filtrate: no growth.

The cultures were again examined April 15, or nine days after they were made, when all of the slants inoculated with V filtrate were found to be sterile and all of those inoculated with the N filtrate, excepting the two slants kept under favorable conditions for growth of *B. abortus*. One of these was contaminated with a coccus, and the other two with two bacilli, neither of which was the abortion bacillus.

Third Experiment

A large amount of infectious material was used in this experiment in order that filtrates from Berkefeld filters of the three grades of fineness on the market could be tested and the large animals receive sufficiently large doses possibly to cause manifest disease in them.

The emulsion was prepared, filtered and inoculated on May 22, 1926, from material collected from horse 276 and mules 286 and 288 on May 19 and 21, and from heifer 1248 on May 20 and 21, and from heifers 1259 and 1262 on May 21. All of these animals were in the active stage of the disease when the infectious materials were collected. These materials consisted of 37 grams of epithelium from tongue vesicles, 230 cc of saliva and 4 cc of vesicular fluid. The epithelium was ground to a fine pulp in a mortar, 0.85 per cent salt solution added and pressed in a meat-press; the saliva and vesicular fluid were then mixed with the fluid thus obtained, and the whole made up to 1,500 cc with 0.85 per cent salt solution after it had been filtered through

filter paper. After 80 cc of the diluted emulsion thus obtained had been set aside for the inoculation of check animals, there were added to the remainder 40 cc each of a heavy suspension of *B. abortus* and of *B. prodigiosus*.

The abortion suspension was made by washing the growth from three well-grown, 11-day, potato-agar cultures of this organism with 0.85 per cent salt solution, passing it through filter paper and making it up to 45 cc with the salt solution. The suspension of *B. prodigiosus* was made in the same manner from three well-grown, potato-agar cultures of this organism grown for two days at room temperature.

After thoroughly agitating the diluted emulsion, to insure the thorough mixing of the suspension of cultures, the whole was passed through a preliminary Berkefeld filter; 780 cc of clear, amber-colored filtrate was obtained, the balance of the 1,500 cc being absorbed by the filter, which was a large one. The preliminary filtrate was divided into three equal portions of 260 cc each. One of these portions was passed through a W, another through an N, and the remaining one through a V Berkefeld filter, the W filter being the finest and the V the coarsest. About 200 cc of filtrate was obtained from each portion filtered.

Check cultures (potato-agar slants) were inoculated as follows: from the suspensions of *B. abortus* and *B. prodigiosus* used to contaminate the emulsion; from the unfiltered emulsion after the addition of the culture suspensions; the preliminary filtrate and the W, N and V filtrates. One-half cc of the inoculum was used for each slant, except in the cases of the bacterial suspensions and some of the slants inoculated with unfiltered emulsion, where three loops were used. Cultures of each material were kept under favorable conditions for the growth of *B. abortus* and also at room temperature in the air.

Animals were inoculated from each of the filtrates V, N and W, as follows: A separate stable was used for each of the animals, large and small, inoculated with each filtrate. The inoculations of the filtrate from the finer, or W, filter were made first; then those from the N, or medium; and then those from the V, or coarsest, filter. After this was completed the inoculation of check animals with the unfiltered material was undertaken.

W filtrate:

Mule 289: 70 cc intravenously and, in addition, filtrate rubbed into scarification on tongue.

Horse 300: 70 cc intravenously only.
6 guinea pigs, subcutaneously, both metatarsal pads.
6 guinea pigs, cutaneously, right metatarsal pad.
6 guinea pigs, 5 cc each, intra-abdominally.

N filtrate:
Mule 312: 70 cc intravenously and, in addition, filtrate rubbed into scarification on tongue.
Horse 295: 70 cc intravenously only.
Guinea pigs: same as with W filtrate.

V filtrate:
Mule 283: 75 cc intravenously and, in addition, the filtrate rubbed into scarifications on tongue.
Horse 292: 75 cc intravenously only.
Guinea pigs: same as with W filtrate.

Unfiltered emulsion (checks):
Horse 287: 10 cc intravenously and, in addition, some of the emulsion rubbed into scarifications on tongue.
Guinea pigs: same as with the W filtrate, excepting that no guinea pigs were injected intra-abdominally.

Results

W filtrate: Neither horse 300 nor mule 289 developed lesions and their temperatures remained normal. To test its immunity, horse 300 was inoculated on the tongue on June 17, or 26 days after the injection of the filtrate, with emulsion of tongue epithelium from mules 283 and 292, collected May 25 and since then kept in the ice-box. The horse failed to develop lesions though two guinea pigs, inoculated cutaneously two days later with the same lot of material, developed characteristic inoculation vesicles on the second day and additional vesicles appeared in one of them several days later. Mule 289 was inoculated in the same manner and with the same material on June 21, but had failed to show lesions 48 hours after inoculation, though a horse inoculated at the same time with the same lot of material developed well-marked lesions in 44 hours.

On June 23, horse 300 and mule 289 were reinoculated with saliva from horse 293, collected a few hours previously, immediately after rupturing of vesicles. Mule 289 developed vesicles on the tongue, principally at other points than at the site of inoculation, on the second day after inoculation. The following day these had coalesced, leaving a very large, eroded area extending over parts of both the dorsal and ventral surfaces. Horse 300 failed to develop lesions.

Of the six guinea pigs inoculated cutaneously and the six injected intra-abdominally none developed manifest lesions. Of the six injected subcutaneously, three showed well-marked, characteristic vesicles. Horse 310 was inoculated on May 28 by scarification on the tongue with vesicular fluid from the vesicles

that developed on the legs of these three guinea pigs. Typical vesicles appeared on its tongue 44 hours later and additional vesicles appeared 24 hours after that. The temperature of this animal was 104.4° and 104.8° F. on the second and third days after inoculation. None of the guinea pigs injected intra-abdominally developed visible lesions.

N filtrate: Horse 295 and mule 312 had not developed visible lesions 48 hours after inoculation, but on the following morning, the horse had small vesicles on the border of the tongue and the border of the lip. Later in the afternoon, small vesicles appeared on the border of the tongue of the mule. The temperature of the horse was 2° F. above normal on the second day after inoculation, but soon returned to normal and again rose 2½° F. on the seventh day after inoculation. The temperature of the mule, except for a rise of 2° F., of short duration on the second day after inoculation, remained normal.

Horse 295 became very lame in the left hind foot on May 28 and had six erosions on the sides and dorsal surface of the tongue and one small unbroken vesicle at its tip and, in addition, erosions on the lips. On May 20 a typical vesicular stomatitis vesicle had formed at the right bulb of the heel of the left hind foot. This was followed, two days later, by a similar vesicle on the other bulb of the heel. Vesicular fluid was yellow in color. Two days later, there was slight loosening of the horny tissue from the deeper structures at the sites of the vesicles. The lameness disappeared soon after the vesicles had ruptured. The foot lesions healed in about ten days from their first appearance.

Of the six cutaneously-inoculated guinea pigs, five developed inoculation vesicles. One of these was killed on May 25 and an emulsion, made from the detached skin and fluid from a vesicle, was used to inoculate horse 296 on the tongue. This horse developed large typical vesicles at the sites of inoculations two days later.

Of the six subcutaneously-inoculated guinea pigs, three developed vesicles.

Of the intra-abdominally-inoculated guinea pigs, one developed vesicles in both fore feet on the sixth day.

V filtrate: Typical vesicles appeared at and around the sites of inoculation on the tongue of mule 283 on May 24, about 44 hours after inoculation. Additional vesicles formed and ruptured the following day, leaving at least one-third of the dorsal surface of

the tongue raw. The temperature was only slightly elevated the second day after inoculation.

Horse 292, not having been inoculated locally, did not show lesions until the third day after inoculation, when a large vesicle had formed on its upper lip. The next day the lower lip was involved. The lips were swollen for several days and the erosions extended. Its temperature was 102.4° F., 42 hours after injection, but soon returned to normal and remained so.

One of the six guinea pigs injected intra-abdominally developed a large, well-distended vesicle on one hind foot but the remaining five did not develop manifest lesions. Four of

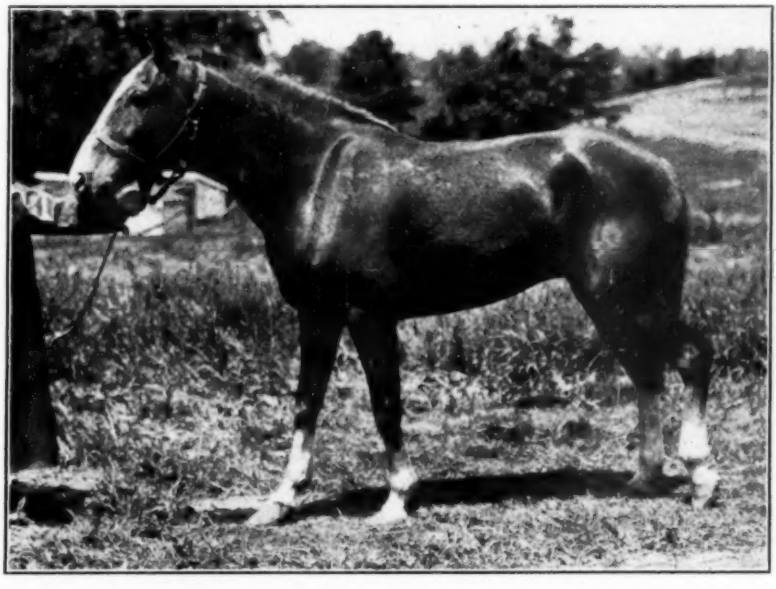

FIG. 1. Lesions of the feet (horse 287) caused by an intravenous injection of vesicular stomatitis material. Four feet affected; lesions more pronounced in right fore and left hind feet. Autopsy of left hind foot showed extensive separation of the wall and sole of hoof from the deeper structures.

the six guinea pigs injected subcutaneously and five of those inoculated cutaneously developed characteristic lesions.

Unfiltered emulsion: Horse 287 developed typical vesicles at the sites of inoculation on the tongue on the morning of May 24, 42 hours after inoculation. Two days later, about one-third of the dorsal surface of the tonuge was denuded of epithelium and two erosions had appeared on the lip. May 27, fresh erosions had appeared on the dorsal surface and side of the tongue. The animal was very lame in the left hind foot, and typical vesicles

had developed on the bulb of heel of this foot. On the morning of May 28, the animal was very lame in the left hind and right fore feet, with vesicles developing on the heels of both these feet, and it looked as though the horny tissue in these regions would separate from the deeper structures. Late in the afternoon, vesicles appeared on the coronet of the right hind foot and also on the coronet and heel of the left fore foot, causing the animal to be very lame. On the following day the foot lesions had increased and the animal was so lame that it could hardly walk. It was killed early in the afternoon. On autopsy the feet showed marked lesions, there being much separation of the horny tissue

FIG. 2. Enlarged view of fore feet of horse 287. The dark vertical line on the right fore hoof is partly dried vesicular fluid from the recently ruptured vesicle at the coronet.

from the deeper structures around the coronet of some, and at the heels of all. One of the feet was sawed vertically on the median line and showed extensive separation of the sole. There seemed to be an unusual quantity of fluid in the sheaths of the deep and superficial flexor tendons, especially of the foot first affected. This fluid, as well as that in the vesicles of the feet, was straw-colored. The tongue was still very raw over a large area. No lesions of the internal organs were observed, except that the spleen was somewhat enlarged.

The temperature of this animal was normal 18 hours after inoculation; six hours later it was 104.4° F.; 48 hours after inoculation it was 103.0° F.; the fifth day after inoculation, at which time foot lesions first appeared, it was 104.0° F. in the morning and 104.8° F. in the evening; the temperature was 102.0° F. the next day and was nearly normal when the animal was killed.

Five of the six guinea pigs injected subcutaneously with the unfiltered emulsion, and all of the six inoculated cutaneously developed lesions of vesicular stomatitis.

The check cultures kept at room temperature were examined May 24, 1926, two days after they were inoculated, and showed the following:

3 slants, W filtrate: no growth.
3 slants, N filtrate: no growth.
4 slants, V filtrate: no growth.
2 slants, preliminary filtrate: one showed about 25 and the other 50 or more colonies, a number of which were those of *B. prodigiosus.*
3 slants, unfiltered emulsion: each slant entirely covered with growth, upper third of which is red.
3 slants, 3 loops suspension *B. prodigiosus:* entire slants covered with red growth.

The above cultures were examined again on the following day, at which time the slants inoculated with the filtrates were still sterile, those with the suspension of *B. prodigiosus* were pure cultures of the organism, and those made from unfiltered emulsion and the preliminary filtrate showed contamination with a gas-producing organism.

The check cultures kept in the incubator, under favorable conditions for the growth of *B. abortus*, were examined on May 25, three days after they were inoculated, and showed the following:

3 slants, W filtrate: no growth.
3 slants, N filtrate: no growth.
4 slants, V filtrate: no growth.
2 slants, preliminary filtrate: one thinly and the other fairly well sprinkled with colonies that had the appearance of *B. abortus* and *B. prodigiosus.*
2 slants, unfiltered emulsion: overgrown with miscellaneous growth.
3 slants, abortus suspension: entire surface of each covered with growth of this organism.

All the filtrate cultures were given a final examination on May 29, or seven days after they were made, with results as follows:

Of the cultures kept at room temperature, the N and V filtrate slants were sterile, one of the W filtrate slants was sterile, one was contaminated with a mould but showed no other growth,

and the other showed the presence of a number of round, convex colonies which on microscopic examination proved to be colonies of an oval bacillus of medium size which was not agglutinated by known-positive abortion serum. None of the colonies showed any color.

Of the cultures kept in the incubator, under conditions favorable for the growth of *B. abortus*, those of all three filtrates (W, N and V) remained sterile, with the water of condensation in each tube clear. One of the slants inoculated with the preliminary filtrate was sprinkled with small isolated colonies, similar in appearance to those of *B. abortus*.

The check cultures thus proved the following:

1. That the suspension of *B. abortus* and *B. prodigiosus*, added to the emulsions before filtration, contained a large proportion of living organisms.

2. That the preliminary filter, while keeping back most of the bacteria, did allow *B. abortus*, *B. prodigiosus* and other organisms in relative small numbers to pass.

3. That the V, N and W filters were impervious to *B. abortus*, *B. prodigiosus* and to the contaminating bacteria contained in the emulsion. The occurrence of growth after a number of days, on one of the slants inoculated with the W filtrate and kept at room temperature, was evidently due to contamination, as the colonies were neither those of *B. abortus* nor *B. prodigiosus*, and, besides, the behavior of this filtrate in all the inoculation tests, showed that the vesicular stomatitis virus passing through the W filter was less in amount than that passed through the two coarser filters, the cultures made from the filtrates of which remained sterile.

Tests of Immunity in Guinea Pigs

To determine whether any of the guinea pigs that received filtrates, but did not show manifest disease, nevertheless had had mild attacks of the disease sufficient to give immunity, they, together with their mates that had shown lesions, and four fresh guinea pigs were each inoculated cutaneously on one of the metatarsal pads on June 23, or 32 days after the filtrate inoculation, with emulsion of detached epithelium from a tongue vesicle and saliva from a horse. This material was freshly collected, immediately after the vesicles on the tongue of the horse had ruptured.

Of 30 guinea pigs that had not developed lesions from the filtrate, 16 had been injected intra-abdominally; 5 with the V, 5 with the N, and 6 with the W filtrate. All of the 16 resisted inoculation with virulent material, made a month later. Eight of the guinea pigs failing to develop lesions had been inoculated subcutaneously, 2 with V, 3 with N, and 3 with W filtrate. All of these resisted the second inoculation, with the exception of one of those that had received the W filtrate. This one developed a small inoculation vesicle. Six that had not shown lesions had been inoculated cutaneously with the W filtrate. One of these resisted the second inoculation, but the remaining five developed typical lesions of vesicular stomatitis, showing that they had not become even mildly infected from the filtrate.

All the guinea pigs showing lesions, as a result of inoculation with filtrates, resisted the second inoculation with virulent material; whereas four checks promptly developed well-marked vesicles following inoculations with this material. It seems, therefore, that the immunity of the guinea pigs failing to show lesions from inoculations with filtrates may be used to measure the amount of virus contained in the different filtrates. Thus five cc of either of the filtrates seemed to contain enough virus to induce sufficient disease to cause a substantial immunity when injected intra-abdominally; approximately four drops of the V and N filtrates did the same when injected subcutaneously in the metatarsal region, but this amount of the W did not always do so, while the small amounts of this filtrate entering the scarified areas in the case of five of six guinea pigs failed to give immunity, while in the remaining one it did.

Discussion

The first of the three experiments just described concerned the coarsest of the three grades of Berkefeld, bacteria-retaining filters. This filter prevented the passage of *B. abortus* but allowed sufficient vesicular stomatitis virus to pass to infect eight of the twelve guinea pigs inoculated with the filtrate. The filtrate failed to cause manifest disease in a horse but did induce in the animal sufficient immunity to resist a second inoculation, two months later, with proved virulent material.

In the second experiment, the coarsest and medium grades of the same kind of filters were used. Both of these were impervious to *B. abortus* and *B. prodigiosus*. The filtrate from the coarser filter, as in the first experiment, caused lesions in guinea pigs but

not in a large animal (a heifer in this instance). The heifer, moreover, did not gain sufficient immunity from the injection of filtrate to prevent infection following an inoculation with proved virulent material eleven days later, though the lesions were about 24 hours late in appearing. It seems possible, had the second inoculation been made after a sufficiently long interval of time to allow the animal to recover completely from occult disease possibly caused by the injection of filtrate, that the heifer would have resisted it. The filtrate from the medium-grade filter caused lesions of vesicular stomatitis in a number of guinea pigs and induced immunity, in all but one of the guinea pigs that did not have manifest lesions, to a second inoculation with proved virulent material, three weeks later. No large animals were inoculated with this filtrate.

In the third experiment, filters of all three grades of fineness, designated by the letters V, N and W, were used and a much larger amount of infectious material was available than in the first and second experiments. It was therefore possible to increase greatly the size of the doses given the larger animals. The results of this experiment were in harmony with those of the other two, and were such as the results of these experiments indicated that they would be. The larger doses of the filtrates given to the large animals caused lesions to appear in those receiving the filtrates from the coarsest and medium filters as well as in the guinea pigs. Neither of the two large animals receiving the filtrate from the finest filter developed manifest disease, but resisted a second inoculation, 26 days later, with proved virulent material, and one of them a subsequent inoculation, six days later, but the other developed disease as a result of the third inoculation. Several of the guinea pigs inoculated with this filtrate developed typical vesicles and the fluid from these caused typical lesions of vesicular stomtatitis to appear promptly in a horse inoculated locally with it. All the filters used in this experiment proved to be impervious to *B. abortus* and *B. prodigiosus* under the vacuum, 6½ inches being used.

In two of the three experiments, guinea pigs which failed to develop manifest lesions as a result of inoculations with the filtrates, with few exceptions, gained enough immunity thereby to resist a subsequent inoculation with proved virulent material. The exceptions were nearly all guinea pigs inoculated cutaneously, especially with the filtrate from the finest filter, where the

amount of virus entering the abraded surface in so great a dilution must have been very small.

It does not seem possible that in the foregoing cases the immunity of the guinea pigs could have been due to any preformed antibody contained in the filtrate, unless it was one capable of multiplication; because the amount of such body entering the scarifications in the cutaneously-inoculated animals could hardly be expected to be sufficient to cause immunity unless it was a purely local one. That the immunity was more than this is proved by the positive results obtained when the second inoculations were made on the metatarsal pad opposite to the one used in the first inoculation.

In the third experiment, the filtrate from the medium-grade filter seemed to be as virulent, both for small and large animals, as that from the coarsest one; but the finest filter prevented the passage of a much larger quantity of the virus. It is therefore possible that a slightly-finer filter would prevent its passage altogether.

Unexpected lesions developed in two of the large animals in the third experiment. The check horse that received the unfiltered emulsion intravenously, and also locally on the tongue, developed marked vesicular lesions in all four feet, with extensive separation of the horny tissue from the deeper structures. One of the horses that received the filtrate from the filter of medium fineness also developed vesicles on the heel of one foot, which caused some separation of the horny tissue from the deeper structures.

The writer previously had found two cattle which showed foot lesions as the result of natural infection, and the case of a bull has been recorded among these experiments which showed lesions in one foot as the result of an intravenous injection. Consequently, it follows, that vesicular stomatitis may cause lesions in one or more feet of horses or cattle, through either natural or intravenous infection.

Conclusions

The following conclusions seem to be warranted.

1. The virus of vesicular stomatitis will pass through the finest of the three grades—V, N and W—of Berkefeld bacteria-retaining filters, in sufficient amounts to infect guinea pigs.

2. Sufficient virus passes through the coarsest (V) and medium (N) grades of the above filters to infect horses, mules and guinea pigs.

3. Both the guinea pigs and larger animals which failed to show manifest lesions as a result of inoculation with the filtrates were in most cases rendered immune to a subsequent inoculation with proved virulent material.

4. Horses as well as cattle may at times develop typical vesicular lesions in their feet, as a result of intravenous injections with vesicular stomatitis virus.

I'VE NEVER SEEN A COW

I live upon a New York street,
Near where the "L" and "cross-town" meet;
It's not so bad; we have a tree;
And when the wind blows from the sea;
We smell the salt—but I'll allow
I never yet have seen a cow.

I've seen the lions in the zoo,
The tigers, camels, zebras, too;
And other beasts from over-seas
I see as often as I please;
It's queer, I think, but yet, somehow,
I've never, never seen a cow.

Of course, I know just how they look;
I've seen their pictures in a book.
They're black, or white, or brown or red,
With curving horns upon their head;
And Ma describes them, anyhow—
When she was young, she knew a cow.

I'd like to live on a farm, I think,
And have a cow's fresh milk to drink;
If we were poor, I'd go to Fresh Air,
Or rich, we'd spend the summer there;
But we're just middling. Yet, somehow,
Some day, I'm going to see a cow.

—ANNA L. CURTIS in *Farm Life.*

If I were advising young men as to their future profession I would say that there are greater opportunities in agriculture than in any other profession in our country.—*William Howard Taft.*

TEACHING VETERINARY MEDICINE TO AGRICULTURAL STUDENTS*

By DAVID S. WHITE, *Columbus, Ohio*

Dean, College of Veterinary Medicine, Ohio State University

I do not claim to speak with authority on this subject, but I think I may speak with experience. This autumn I begin my thirty-fourth year as a teacher, and my first class, in the fall of 1893, was made up largely of students in agriculture, most of them majoring in animal husbandry. I felt then, as I do now, incompetent in the premises. Before me sat a small group of young men just from the farm, each anxious to be initiated into the mysteries of medicine; to learn how to treat live stock and, at the same time, attempt to satisfy that curiosity which is always awakened in one who grapples with mystery. To the average layman medicine is a mysterious thing. Not infrequently in his mind there is something connecting it with religion. All of it is to him intangible; its intangibility makes it all the more attractive.

The medical art has always surrounded itself with more or less mystery. There are several reasons for this which cannot be discussed here. Ignorance, tradition and religion are the principal factors which make it so. The practice of medicine is an art and not a science. Much of the art is not well understood and is, therefore, mysterious. The average professional man must profess to all knowledge coming within the realm of his profession. In his mind, to admit that he does not know might seriously affect the confidence of those who consult him. Therefore, he is reluctant to admit ignorance. As a general rule, such an individual fears exposure. He realizes where he is weak and vulnerable and, like a wise general, makes every effort to keep this knowledge from those with whom he must deal.

In the last decade there has been a good deal of discussion in the veterinary profession concerning the teaching of veterinary medicine to agricultural students. Probably much of this was precipitated by the inauguration of a system of sending, to the American farm, teachers and advisors who taught and advised on the farm. These men were known as county or district agricultural agents and, as the system was new, most of them were

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young and inexperienced and some of them failed to recognize at once just what their functions were. Naturally, the farmer felt that he was receiving something which cost him nothing. In whatever emergency or distress he might find himself he turned to the agent to help him out. As there is live stock on practically every farm and, wherever live stock exists, injury and disease appear, not infrequently the agent was called upon to administer to sick animals.

County Agents Take Up Preventive Medicine

Some of the county agents were ambitious to do things veterinary on a larger scale and in a more pretentious way, so entered the field of preventive medicine, even to the extent of applying sera and the like to healthy animals, to prevent their becoming sick; or administering drugs to groups of animals, such as drenching sheep and swine, to prevent or cure parasitic invasions. Occasionally public demonstrations were staged to show how it should be done. Nearly all of these young men are college graduates and most of them have had some training in veterinary medicine while in school. They were in no sense professional men in that they were trained and experienced in dealing with disease. In fact, some of them knew nothing of the sciences underlying proper medical training. Very few of them possessed any knowledge of anatomy, physiology, pathology or even bacteriology as it applied to disease. Probably if they had had these things and understood them they would not have been so keen to enter upon the realm of the professional veterinarian. While they did know something of the applications of these sciences—a smattering of veterinary art—the work they did was not professional, in the modern sense of this term, but a pronounced form of empiricism.

The difference between an empiric and a professional man is that the professional man knows the fundamental principles which underlie what he does. A scientific veterinarian, called to see a cow with a tumefaction on her jaw, will recognize it as an inflammatory process caused by a specific fungus—the *Actinomyces bovis*. He knows that this fungus is destroyed by iodin. He realizes that to give internally metallic iodin, in powder form or as a tincture, in sufficient dose, would be too irritant for the digestive tract. He, therefore, chooses one of the more soluble salts of iodin, prescribing the iodid of potash. To get results he recognizes that the system of the animal must

become thoroughly saturated with the drug. Therefore, he pushes it until the symptoms of iodism appear, when he stops the administration temporarily, to begin again when the symptoms of iodism disappear. The empiric, on the other hand, who knows nothing of the fundamentals in the premises, recognizes the case as one of "lumpy jaw." He knows that he can obtain from the druggist a white powder, which he calls "potash." This he gives until the patient gets off feed, shows eye and nose discharge, and perhaps "scurfiness" of the skin, when he stops using the powder until these signs cease, when the treatment is resumed. In either case the results are much the same, often identical. The tumefaction becomes smaller and the process of its development perhaps permanently arrested. The owner of the patient is interested only in the results. Therefore, he feels naturally that the empiric is just as good as, if not superior to, the professional, especially if the results cost him less money.

An Exemplary Case

There does not seem to be any relationship between a man's education and general intelligence and his choice of a physician or a church. How many people investigate the scholastic history and training of the family physician? How many have investigated the religions of the world in order to determine whether or not he should become a Christian or something else? How many people are Roman Catholics or Protestants because they have studied the creeds and disciplines of these organizations? Very few. I once knew a young man, a Doctor of Philosophy, from one of the most noted eastern universities, a man of unusual mental ability, a splendid teacher and a good mechanic. He taught physics, having charge of a large laboratory. He had designed a number of mechanisms to illustrate different physical phenomena and was very keen in demonstrating them to his students. His religion was that of a cult, made up largely of people of wealth, education and intelligence. The professor did not believe that anything *really existed.* Disease to him was purely a fabric of the imagination. He was suffering from tuberculosis of the vertebrae, which greatly distorted his spine. At times he became ill which he spoke of as "weakness." His treatment consisted in drinking hot soups at hourly intervals and reading pamphlets containing the most incoherent and incredulous subject matter. Finally, in one of his "weaknesses," he "passed on" and forever disappeared from our midst.

An eminent professor of animal husbandry, the author of several books on this subject, in charge of a state herd of cattle, badly infected with tuberculosis, attempted to eradicate the disease by the Bang method. He, therefore, had built a specially designed barn, so constructed, by leaving out the upper three feet of the siding, as to make the ventilation intensified. In this barn he placed most of the reacting cattle, not all of them, as some of the animals had cost a good deal of money, were prize winners, and, therefore, in his opinion, should not be subjected to the strenuousness of intense ventilation. He permitted these animals to remain with the non-reacting part of the herd. In the middle of the barnyard, onto which both of the barns opened, was a single, concrete watering-trough. In the center of the watering-trough was a stove to temper the water in cold weather. Once daily the whole herd, reactors and non-reactors, was allowed access to this single watering-trough and the opportunity to commingle for an hour or two. There is an old German saying, appropriate to this situation: "Er hort die Glocken, weist aber nicht wo sie hangen." These illustrations suffice to prove my point. What, then, may we expect of the average layman, whose education was obtained in the little red school-house and whose worldly experience from the small town, perhaps the capital of the county.

Veterinary Medicine Taught in Practically All Land Grant Colleges

There is a land grant college now in every state in the Union. In each of these colleges, except one, courses are given in veterinary medicine. At eleven of them professional veterinary schools are maintained, each offering a four-year curriculum leading to a doctorate degree. At four, two-year courses are given, so arranged as to apply to the first two years of the average veterinary professional curriculum. All of these colleges and universities but one (New Mexico) furnish training in veterinary medicine to young men studying agriculture, especially those specializing in animal husbandry. In all but three (Arizona, New Jersey and Rhode Island) graduate veterinarians give this training. The single course announced by the University of Arizona is conducted by the instructor in animal husbandry, assisted by the instructor in dairying; in New Jersey and Rhode Island by the respective professors of animal husbandry.

The courses offered vary greatly in number and content. Usu-

ally the land grant colleges which include professional schools offer the least veterinary instruction to agricultural students. Usually only one course, at most two or three, is given, running through the year. These courses usually include some anatomy, principles of horseshoeing, hygiene and sanitation. Of course, at such institutions there is nothing to prevent an agricultural student electing professional subjects out of the curriculum offered by the veterinary school, provided he possesses the necessary prerequisites. However, this is rarely done, probably because agricultural curricula nowadays take up most of the students' time.

Variety of Subjects Taught

At several of the land grant institutions, such as Purdue, Minnesota, North Dakota and California, several veterinarians, usually from three to five, are employed. It is a common practice for a well-organized department of the type maintained at these institutions to offer, outside of instruction in the technical and professional subjects, such basic courses as physiology or bacteriology. In the smaller institutions it happens not infrequently that the veterinarian teaches most of the biology, usually with the exception of courses in zoology and entomology. Most of the institutions maintain veterinary buildings and quite frequently veterinary hospitals, some of them well equipped with all modern appliances for restraint and routine operative work. It is quite customary to hold clinics, a few times weekly, at these hospitals, the agricultural student taking part in the clinic much as the veterinary student does in a veterinary school.

One western institution offers eleven veterinary courses, beginning with "Veterinary Elements," which includes an introduction to anatomy and physiology and the common ailments of domestic animals and how to treat them, up through hygiene and infectious diseases, meat inspection, obstetrics, poultry diseases, principles of horseshoeing, comparative anatomy, a real course in physiology, and veterinary clinics—hospital and ambulatory. All of these courses are conducted by one individual, a graduate veterinarian. Another large university, farther east, also offers to agricultural students a similar list of courses but has on its staff six graduate veterinarians, four of whom have academic degrees besides the veterinary degree.

There are probably two factors which determine the quality and quantity of veterinary work offered to agricultural students.

The most important factor is, of course, the man. An energetic, hustling, efficient veterinarian, who makes a place for himself among his academic colleagues and has a following in the state, will obviously build up a rather comprehensive veterinary department. On the other hand, a man of the opposite type will be content to retain the *status quo* (which means educationally he is going backward) until he is finally carried out to sea and becomes lost in the ocean of oblivion. The local conditions prevailing form a second factor. Obviously, these vary greatly in the different states, dependent upon whether or not agriculture, especially animal husbandry, dominates or maintains a parity with commerce and manufacturing.

Reasons for Teaching Veterinary Medicine to Agricultural Students

The reasons given for teaching agricultural students veterinary medicine, where any statement in this regard is made at all, are: (1) To teach first aid to the sick and injured; (2) to teach nursing of sick animals; (3) to give some training in the diagnosis and treatment of "common ailments"; (4) to make the stockman more intelligent concerning animal diseases—the idea being to make him more cooperative when called upon to assist the authorities in controlling or eradicating plagues; (5) to give the stockman a better foundation, through anatomy and physiology, for the judging of animals and their feeding and breeding; (6) to provide the young farmer with a working knowledge of preventive medicine through courses in hygiene and sanitation, and (7) to offer work in veterinary subjects which will be acceptable in veterinary schools should the student later decided to become a veterinarian.

All of these objects are laudable and, as a whole, in the opinion of the writer, do more good than harm. The graduate in agriculture who goes back to the farm may apply them with his own live stock and he may help out a neighbor once in a while. But there is nothing new about this. The lay-treatment of men and beasts has always existed in rural communities and always will exist, as long as the spirit of mutual helpfulness remains among us. Through preventive medicine, which includes better methods of handling healthy live stock, obviously many diseases are prevented.

In enlightened communities modern husbandmen have learned to apply prophylactic methods which prevent many gastro-

intestinal disorders—conditions such as milk fever, azoturia, etc. The same is true in human medicine. In the city in which I live, twenty-five years ago, typhoid fever took its continual toll of the population. A family that escaped its ravages was the exception and not the rule. Largely through the influence of the medical fraternity of that city, the taxpayers expended over four millions of dollars in the construction of a water-supply system, which furnishes an ample quantity of pure, soft drinking-water and, incidentally, has made typhoid fever one of the rarest diseases. My family physician told me that this plant had cost him $2,500 a year in typhoid cases he no longer got.

The Narrow and Broad Viewpoints

In this matter, there are, of course, two viewpoints—the narrow and the broad. The narrow governing, we should keep from the public all medical information which would tend to reduce disease and confine it to a few persons especially trained to cope with disease and to receive pay for so doing. The other viewpoint is to furnish the laity with that of medical knowledge, which, when applied, will promote health and prevent disease. Of the two viewpoints modern medicine has chosen the latter and, in our opinion, has chosen wisely. We must remember that times are different now from what they were a few decades ago. Modern methods of transportation, the rapid dissemination of knowledge, and the existence of great educational institutions, each containing thousands where they formerly contained dozens of students, all mean that the average man of today is much more intelligent, mentally alert and discriminating than were his ancestors. This means that the average citizen of intelligence can obtain from an authoritative source the information he may seek on nearly every subject and usally without much loss of time or expense in money. In conformity with this idea we believe that the veterinary education afforded by the land grant colleges of the country is a contribution toward making the country healthier and wealthier. While in isolated cases an individual may suffer here and there, as a rule it is as much due to himself as to the situation in general. Undoubtedly, in some instances, there is a lack of comprehension on the part of the veterinary instructor and, as a result, actual harm is done. However, we feel that these cases form the exception rather than the rule.

The land grant university has made veterinary medicine a

great contribution by introducing it to many persons of education and intelligence who otherwise might either never have heard of the profession, or had held it in low estimation. Many of the veterinary teachers in such universities commanded profound respect among their colleagues, were well known on the campus among the student body and thus gave to our profession an introduction among scientists and other scholars it might not have enjoyed otherwise. Thousands of Cornellians knew Professor Law; University of Missouri alumni and ex-students, Doctor Connaway, and in Texas, Doctor Francis, after whom a college building has been named. These men, and many others similarly situated, have held our banners high.

Teach the Fundamental Principles

Our own experience through the years has been to give the agricultural student taking veterinary medicine an appreciation of what veterinary medicine really is and what the functions of a veterinarian should be. We try to impress upon our students the importance of our profession in the general scheme of modern civilization. We then attempt to teach him something of the fundamental principles, as far as they can be made understandable to him, of anatomy, physiology and pathology. In pathology we try to give him a conception of what inflammation really is, how it operates as a protective mechanism and in the healing of wounds. The average veterinary practitioner, in 95 per cent of his cases, deals with inflammation in some form or another. Yet his ignorance of what inflammation really is is profound. I blame the schools for this. When an undergraduate student, my knowledge of inflammation consisted of one sentence: "Inflammation is increased and perverted nutrition." I never knew what "perverted" meant until ten years later, but I did know that that short sentence was worth 10 per cent on the average final examination.

The most valuable course of training I ever received was under Professor Johne. His lectures and demonstrations on pathological anatomy, made up almost entirely of inflammation as it affected the different tissues of the body, I found more useful in practice than in trying to christen each abnormal condition with which I came in contact and then treat the name. But it is very difficult to get the pathologist to do this thing. In my experience too many of them are more interested in keeping the microtome knife sharp, making liver and kidney sections for microscopical

study and delving into the realm of pathogenic bacteriology, than they are in developing the subject from the standpoint of the clinician.

Not long since, I heard a lecture by one of the largest employers of engineers in the world. His advice to the engineering faculty and student body of a large university was to teach the boys the underlying principles of engineering. He insisted upon mathematics, physics, chemistry—the fundamental sciences. Given a graduate so equipped, he told us, the art of engineering they would receive in his shops and factories in a most practical way.

Prescriptions Rarely Asked For

In teaching agricultural students for a third of a century I have dwelt less and less upon the art of practice. To teach a man how a wound heals is one thing; to give him the details of how to treat a wound without this knowledge is something entirely different. The former makes him intelligent and cooperative and gives him a greater respect for things medical; the latter makes him a quack. It is very rarely that a student, once his mind is opened, will ask for anything more. I do not believe in all the years a dozen students have requested specific prescriptions for specific ailments and I do know that most of the hundreds of agricultural students who have passed through my hands and gone out to battle with the world have employed veterinarians, provided they found them worthy.

I once received a letter of protest from a veterinary graduate because an ex-student of dairying, who had received veterinary instruction at our University, was "cleaning his own cows." Later, I received a letter from the ex-dairy student. It seems his father owned a valuable herd-bull, which was taken sick and the protesting veterinarian was called in to administer. He explained to the astonished dairymen that this bull had swallowed the proximal end of a broom-stick, which he could palpate in the dorsal portion of the rumen on the left side. He proposed a major surgical operation. During the operation some new discoveries were evidently made, as the dairyman was informed that the foreign body, in defiance of all natural laws, had made its escape from the rumen and was now deeply embedded in the surrounding muscular tissue. During the course of the operation—and explanations—the bull gasped and "gave up the ghost." Later investigation showed that the animal was suffering from acute

miliary tuberculosis, involving all parenchymatous organs, and the broom-stick turned out to be a supernumerary rib! Quite recently a graduate veterinarian uttered a protest against a representative of a university, for giving demonstrations on poultry diseases in order to stimulate a greater interest in this particular field, not only among poultrymen but the veterinary profession. Later he explained that his wife handled his chicken practice, as he knew nothing about it.

Passing Through a Crisis

On the other hand we have not forgotten that veterinary medicine is passing through the most critical stage of a very critical situation. Practitioners who formerly gave little thought to the veterinary activities of laymen, except that they were professional quacks, now finding their income reduced, in many instances one-half or two-thirds, are obviously jealous of anything which seems to encroach upon their practice. Our great animal wealth, amounting to over eight billions of dollars, finds its future jeopardized because so few veterinarians capable of coping with present-day conditions are available. With only 130 novices entering the profession annually, or, less than three for each state, it would seem that the condition will soon become alarming. The thoughtful veterinarian realizes what this may mean in the future. The lecture-halls and laboratories of the college are now nearly empty. Should the schools go out of existence, and already some of them seem in the throes of a lingering death, the profession must wane. When the schools die, the profession must die with them, as its only source of supply is the school.

The various legislative enactments controlling the veterinary profession will then undoubtedly be subject to drastic modification. The bars will be let down so as to enable lay pretenders to enter practice. The courses in land grant colleges given to veterinary students will be made more comprehensive, farmer boys will be taught veterinary art in a concrete way, and our associations, state and national, will become diluted with an unprofessional element if they do not disappear entirely, creating an impossible situation from a professional standpoint. As it now is, the profession will have only a historic interest. To avert this calamity lies within our grasp. Encouragement rather than discouragement should be given the intending veterinary student. It is a short-sighted policy to avoid doing this thing.

While personally I believe the future of the profession is today greater than it ever has been, it may take a long time for it to recover from its present condition and, in the meantime, its progress may be arrested for a great many more years.

While I may have said much and told little in this paper, I trust its object may be attained. I wrote it not so much to give advice as to receive it. I trust, therefore, it will promote relevant discussion which will be helpful.

DISCUSSION

DR. B. A. BEACH: I have not had very extensive veterinary experience with agricultural students, but there is one point that I would like to mention. It seems to me there is some danger within the profession itself; those of us who are connected with agricultural students know that there is some pressure being brought to bear upon the veterinarians to impart certain knowledge, especially laboratory technic, to those who have not had the proper training. There has been some of that done. Now, there is great danger in such procedure to the live stock industry. A case in point is as follows: One of our veterinarians went to a certain eastern state as station veterinarian, and when he arrived he found that they had been testing chickens for bacillary white diarrhea, by the agglutination test, for several years, and that the men who had performed this work were their own graduates, who had no training in veterinary science, very little or none in bacteriology; they had simply gone to another laboratory, found out how to perform the test, got some cultures, and came back to their own institution. How many thousands of birds had been tested by this method I do not know, but certainly a hundred thousand. Now, these boys could bleed a hen more skilfully than most veterinarians; they understood the technic of the agglutination test as well as anyone needs to understand it, but the important thing—the basic thing—they did not understand. Mind you, they accredited fowls on these tests. In the last twenty-eight thousand birds that they tested they got no clear-cut reactions. This veterinarian, who had recently arrived upon the scene, investigated the matter, and he found that they were making their antigen out of a contaminated culture of the organism they were using. Now, therein was a great danger; they not only did not do any good, but they did a great deal of harm. They understood the different tests, but they did not understand the underlying principles. Now, that is the point I wanted to make, that we in the state laboratories owe it to the live stock industry, as well as to the veterinarians, not to impart certain superficial knowledge to those who are not qualified.

INTERNATIONAL VETERINARY CONGRESS

The Dutch Ministry of Agriculture has appointed Dr. L. De Blieck, of Utrecht, to succeed Dr. D. A. De Jong, who died May 31, 1925, as secretary of the Permanent Commission established at The Hague, January 1, 1914.

A. Leslie Sheather, D. Sc., M. R. C. V. S., has been appointed Honorary Secretary of the Organizing Committee and Honorary General Secretary of the next Congress, to succeed the late Sir Stewart Stockman.

An invitation will be submitted to the first meeting of the reorganized Permanent Commission, to hold the next International Veterinary Congress in London.

ARE VETERINARY COLLEGES SUPPLYING THE NEED OF VETERINARY EDUCATION?*

By C. H. STANGE, *Ames, Iowa*

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It is very difficult to secure satisfactory information and to arrive at a definite conclusion on many of the points involved in the title of this paper. This is due largely to the variation of opinions as to what a college education in veterinary medicine should consist of. While some maintain that with the time available only fundamentals should be offered, others insist that veterinary colleges should graduate a product comparable to a practitioner of several years' experience. The reasonable qualifications which should be expected are probably somewhere between these two extremes.

Perhaps none of the deans of the various veterinary colleges would admit that his courses and facilities have ever been all he desired them to be. Nevertheless these handicaps cannot be held responsible for all the incompetency and resulting difficulties in the profession. Many men have personal handicaps that no college, however well equipped, could ever overcome. If the colleges are to be criticised, they merit censure for allowing such men to be graduated and to become members of the profession. In fairness to our critics and in order to be honest with ourselves as a profession it is necessary to admit that we have many men in our profession who should never have been graduated, at least not in veterinary medicine.

The first question that may be raised fairly, therefore, is whether the veterinary colleges are doing all that should be done in regard to the elimination of the personally, mentally or otherwise unfit, from the standpoint of the requirements of a professional career in veterinary medicine. We all know how difficult it is, with our present limited enrollment, to eliminate students and thus further decrease our present small numbers. This question, however, it seems to the writer, should be decided from the standpoint of welfare of the profession and the live stock industry—and not enrollment.

I think the transfer of all veterinary students from one institution to another should be very closely scrutinized by this

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Association and perhaps also by the Federal Civil Service Commission. I believe that when a veterinary student desires to transfer, the reason or reasons for his desiring such a transfer should be ascertained by the dean of the institution to which the transfer is desired. It is only by such cooperation that scholastically deficient or personally defective individuals can be kept out of the profession. So long as deffcient young men can be eliminated from one institution, only to be accepted by another and apparently actually welcomed in some cases, no progress can be made in this direction.

Veterinary Service Essentially Economic

In my judgment it is unfortunate that, as educational institutions, we have been in the habit of comparing our profession with that of medicine. Scientifically and technically this comparison may be satisfactory but practically there is a very wide difference. Our profession performs, in most of its branches, an essentially economic service. This is particularly true of practitioners. The physician's service is not weighed on the economic balance but measured by a social and sentimental scale. This, it must be remembered, influences decidedly the business side of veterinary medicine which, after all, is the real crux of many of our difficulties.

We must admit that the offers of free service along veterinary lines by subsidized agencies create financial difficulties for the practicing veterinarian. It is impossible to maintain a graduate veterinarian on his own resources and a subsidized quack on the government pay-roll in the same community. The veterinary colleges generally, in my opinion, are not responsible for this situation. Naturally, however, this interferes with the interest of young men in the veterinary profession when they come to consider a life work.

We have heard a great deal about the wonderful progress that has been made in veterinary medicine. This cannot be denied and expresses volumes for the industry and intelligence of the members of our profession. However, when we come to measure progress it must always be a comparative estimate and while we have made great progress in the veterinary profession we must not forget a still more wonderful progress has been made during the same period along many other lines. For example, means of transportation, communication and, in fact, most branches of the industries have shown a revolutionary develop-

ment during the past quarter of a century. So, from a comparative standpoint, we should not be content in the future with what has been accomplished in the past in our professional work. In answer to this I would suggest that the profession needs the results of more thorough and fundamental research on the part of educational institutions.

Local Veterinarian Sets the Standard

We hear frequent reference to public opinion and appreciation of veterinary service. This is frequently discussed, especially in connection with the problem of advertising. While I concede that we could do much in the way of advertising the profession, I think we should not lose sight of the fact that a representative of the profession is the greatest advertising factor we have in his community. What the local veterinarian does and is, sets the standard in that particular community and it is essential for all of us to remember this important fact. No amount of newspaper publicity or other propaganda can very markedly change this opinion of the man who is in daily association with people in the neighborhood which he seeks to influence by advertising. A veterinarian's standing in his community depends very largely on three principal factors—his professional or technical ability, his reputation as a business man and his personal and social qualities. The best advertising, therefore, for the profession as well as the colleges is the men it develops. It is difficult to say whether our colleges have done their duty in this respect.

Many of the graduates of veterinary colleges express the desire that students should have more education in business methods as related to their professional work. I believe that this desire should be recognized in outlining courses in the future. A desire is also expressed for a broader education. As nearly as I am able to determine, they believe this should be in the form of cultura studies. This is very desirable but it has long been a problem of deciding which are the more important studies, cultural or technical, and, in our anxiety to produce men who could make good from a professional standpoint, we may have neglected somewhat the cultural side. Many graduates at least feel handicaps along this line. This is not merely an opinion but is based on a careful survey.

In conferring the professional doctor's degree, at the end of a college course which at first was two years, then three and now four, a custom was established which, with the development of

our educational system, has become illogical and in my judgment should be discontinued. The completion of the four-year course, as at present outlined and offered at our veterinary colleges, should lead to the degree, Bachelor of Science in Veterinary Medicine. Under our present arrangement a student has nothing more to look forward to in veterinary education so far as education and degrees are concerned. In short, he is considered a finished product. Unless one desires an educational or research position, there is little stimulus to pursue veterinary or other educational lines further. The doctor's degree, which is now conferred at the end of four years, should be offered only after further study, or at least five years of successful experience and a satisfactory thesis or other requirements which may be deemed necessary and advisable and in any case should be of good standard.

More Practical Training Desired

A large number of our alumni have indicated that a more extensive training in the application of the fundamentals, before leaving college, would be of great assistance to them. In some other branches of education this is not deemed necessary. We cannot fairly compare our graduates, for example, with those in engineering and some other technical lines, because as a rule our graduates, after establishing themselves in practice, are isolated and on their own responsibility. They do not, as a rule, go in practice as assistants or apprentices and for this reason they should have as much of the practical application as is possible, and I feel that veterinary colleges generally have been weak in the clinical courses offered to the veterinary student.

All the problems referred to above have been under consideration for some time. We have been studying them in connection with the graduate work which we have been offering over a period of seven or eight years. Under this arrangement a graduate veterinarian, with entrance requirements equivalent to that of the veterinary college, could register in any courses in the graduate college, which includes all departments of the institution. He must of course be prepared to carry the courses he elects. This has led to a considerable number taking one or more years of graduate work and some completed sufficient work and received the M. S. degree. This arrangement, however, does not seem to have met the feeling, on the part of our veterinarians, that more practical application should be given them and equally as sig-

nificant a feeling, on the part of many of our best live stock producers, that they are not getting the kind of service to which they are entitled. We plan to meet this situation, as soon as circumstances will permit, by offering a four-year course similar to our present course, with possibly some modifications, but leading to a bachelor's degree. In addition we expect to offer a fifth year of intensely practical work, the requirements of which should be very rigid and on completion of which a doctor's degree will be granted. The doctor's degree would also be granted after five years of successful experience and other requirements already referred to.

In preparation for giving this work, additional clinic facilities are needed. One wing of this new clinic unit is already under construction.

Research Farm Being Developed

In order to meet the demand for more intensive and extensive research work, which is a fountain which supplies the educational stream which nourishes our student body and profession generally, we are developing a research farm which we hope, together with the other veterinary research work carried on at veterinary colleges and experiment stations, will supply the demand for new knowledge in regard to animal diseases and their control, public health and other professional problems, which are of such vital concern to the profession.

In closing, I wish to emphasize that this paper is not presented in the spirit of fault-finding, but with an honest effort to present some of the defects in our educational work and methods for relieving them. The veterinary profession and its work vitally affects the human race, although it may be somewhat more indirect than the medical profession. Man has domesticated only such animals as would be economical and beneficial to his existence. Without these animals the human race would be in a sorry plight, and without the veterinary profession many of these animals would be more of a menace than a benefit to the human race. We have made progress, but we must make still more rapid progress. We have increased our standing, socially and professionally, with the public but this recognition must be still further enhanced. Most of these things must come through veterinary education and consequently through the veterinary colleges. The methods I have indicated are the ones we believe will help to solve many of these questions.

EDUCATION AND VETERINARY MEDICINE*

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A few years ago the Committee on Intelligence and Education recommended that the profession should continue to make progress educationally. Like sentiments have come from others in the Association. The suggestion has been offered that in the present low ebb in the number of veterinary students, a longer curriculum or higher entrance requirements would result promptly in a larger registration and professional preferment. Another has proposed the amalgamation of veterinary with human medicine. On the other hand, the need for veterinarians is so acute that men have had the audacity to appeal for lower requirements to practice. Further, certain agricultural agencies are endeavoring to popularize knowledge of animal diseases and teach farmers how to become their own veterinarians. Certain enthusiasts have hinted at the possible absorption of veterinary medicine by animal husbandry, thereby eliminating the profession. In this maze of dreams and visions as to the future it seemed wise that someone should attempt, at least, to bring about a better understanding of the educational complex of veterinary medicine.

There are members of this Association who are familiar with the desperate struggle for better training that waged in this country from the opening of the land grant colleges until the present standards were fixed in 1918. You are aware, also, of the rapid decline in the number of veterinary students in the United States from approximately 1300, in 1917, to 500, in 1925. Those connected with the administration of our colleges know of the appeals for practitioners that come from communities, often containing a large animal population, where owners are unable to obtain service because of the long distances to veterinarians. The number of animals in this country, including poultry, is very large and still growing and the annual losses from diseases are enormous and increasing. Again, we cannot close our senses to the fact that new and serious maladies are appearing and many that are known to science

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are receiving indifferent attention. Inefficiency due to inadequate qualifications and the inability in many localities to secure veterinary service explain why much work of economic and sanitary significance is not done at all.

With the exception of small animal practice, the veterinary problems are largely with the diseases of farm animals that are owned by men whose business is beset with many hazards. The remuneration, therefore, cannot be in excess of reasonable fees, fixed on a strictly economic basis. For service in protecting the public against the diseases of animals communicable to man, the veterinarian, like the health officer, receives very little. In a very direct and practical way, veterinary medicine has to safeguard animal husbandry, which is the largest industry in agriculture, but it is scattered over the entire country. From its very nature, the service required must be rendered promptly, efficiently, and on the farms where the animals are. These are among the factors that should not be overlooked in considering further advances. The great fact must be kept in mind that the practical necessities of life do not, as a rule, allow aspirants to veterinary practice to give more than a limited amount of time to their undergraduate studies. Some very wise man long ago affirmed that "every question in the long run is a question of finance" and there is much to be said for that view.

The Object of Veterinary Education

The object, then, of veterinary education is to enable practitioners on the one hand to prevent the diseases of animals by their knowledge of etiology, hygiene and sanitary science, and on the other hand to divine their nature and to alleviate or cure them by their knowledge of pathology, therapeutics or general medicine. With further knowledge veterinarians would become better teachers and counselors for the owners. The administration of remedies is but a part of their work. They have to deal with vital things and their ability to succeed rests on their understanding not only of the art, but the subtle, and often unrecognized, relationships that exist between the service they render and the prosperity and happiness of their clients.

A veterinary college is strictly a technical school—a school in which a practical profession is taught—while the public school and university are places in which knowledge is obtained without special reference to its application. An analysis of the educational qualifications of leading, and successful, professional men

will show that they consist of two parts, namely, a good general education and a thorough understanding of the technic pertaining to their occupation. By the same token, the successful veterinarian should be a person schooled in those subjects that give him culture and understanding—the points that make the human contacts—plus discipline in veterinary science. It seems clear, therefore, that the prerequisite consists in a study of those branches of knowledge that are most effective in disciplining the mind, developing the reasoning power and in creating in the youth an ambition to know and understand the problems of his future profession.

The Outstanding Weakness of the Profession

From years of experience and observation, I believe the outstanding weakness in the veterinary profession today is to be found in its general, rather than its technical preparation. There are many improvements to be made in veterinary teaching, but, on the whole, it is direct, reasonably efficient and extended over sufficient time. General knowledge has increased so rapidly and is of such a varied nature, that the schools on which we depend to prepare students have difficulty in orienting it. Many of them have drifted into a position where they feel compelled to give as broad a perspective of human knowledge as possible. In doing this they have substituted a wide range of facts for thorough training in a few basic subjects. This may be more helpful for the masses. Education, however, is an active process and mental discipline is its first, and most essential, element. Although our high schools proudly display curricula as comprehensive as did the colleges of liberal arts a few decades ago, students often come from them to our technical schools "ill prepared in the classics and not at all prepared in anything else." They have been instructed in many things, but they have not learned how to study or how to think for themselves. All knowledge is good, but, as Huxley puts it, "to know a little well, one must be content to be ignorant of a great deal."

We are living in a period of educational readjustment. There is such a volume of new facts and attractive theories that a tendency has developed to substitute "masses" of information for the more tedious mental grind in English composition, ancient languages, mathematics and basic sciences. With all its improvements, the modern method of preparing men for college seems to lack the stable qualities of disciplining the mind and develop-

ing in the youth determination, perseverance and character that are necessary to make educated men.

Coincident with the advent of the vast amount of new information, theories are being advanced for the purpose of acquiring knowledge easily. At the same time a widespread movement developed to popularize technical education and make it easy for laymen to acquire. A superficial impression of a subject has been accepted for a real knowledge of the same. Certain educators have conceived the idea of helping the farmer by instructing him how to control, or treat, the diseases of his animals. Men cannot use knowledge unless they possess it, now, anymore than heretofore. Natural laws are operating the same, human intelligence is advancing slowly, if at all, and the capacity of the mind to understand has not increased materially in recent years. Accompanying these modern efforts to popularize technical knowledge, there has been an awakening in the medical professions to the necessity of more thorough technical training in every branch. In human medicine it has resulted in the development of a large group of specialties. As a result, health centers are springing up and the people of the country and small towns are being deprived of medical care. The human patient can be taken to the city hospital, but the sick animal must, for economic reasons, be treated at home. Veterinary medicine, under present methods in animal husbandry, cannot become so highly specialized.

Emphasis Placed on Art

Veterinarians, like physicians, have placed emphasis on their art. In the beginning that was natural. In all medicine the application of theories has been quite independent of cause and effect and the art has not been quick to accept the teachings of science. One of the difficulties in veterinary medicine is its failure to recognize that the greater part of the sciences which contribute to make it what it is today, did not originate within the profession. All medicine is a large debtor to the pure sciences, and thorough knowledge of them would help the practitioner to a more intelligent understanding of the laws that govern health and disease. We cannot estimate the benefits veterinary medicine has derived from the work of Pasteur, the chemist; Tyndell, the physicist; Metchnikoff, the zoologist; Cohnheim and Virchow, the pathologists; Koch, the bacteriologist; Cohn, the botanist; Petinkoffer, the pharmacist and Gage, the microscopist. A

thorough knowledge of these sciences enables one to comprehend the complexity of the natural agencies in the cause and prevention of disease. The accumulated findings of the ages have been crystallized by the great leaders of science into understandable treatises. They have elucidated the nature of disease and made modern veterinary medicine possible.

There are a few veterinarians, unmindful of the vast storehouse of knowledge provided by the biological and physical sciences, and from which men of all occupations obtain such information of natural things as their interests require, who have concluded that veterinary medicine has a monopoly on the pure sciences found in the veterinary curriculum. This conception of the right to control the use of knowledge which they did not produce, has led them to criticise men who teach such subjects to students in agricultural colleges. Why should not animal morphology, physiology and sanitary science be taught to the future husbandmen of the country? What institution of learning has a right to keep God-created truths from students who wish to know them? It was to systematize and make available to all the knowledge divined by individuals that universities were established. Not until then did medicine rest securely on science and the veterinarian achieve standing as a professional man. The truths of science, when recorded as such, are free to all.

A Professional Crime

It is the *art* of veterinary medicine that should be safeguarded. The application of remedies involves an understanding, not only of the nature of the disease and its diagnosis, but the proper use of medicines as well. The interpretation of symptoms in terms of actual tissue changes, and the differentiation of the causes that might produce them, require a knowledge of the symptom-complex of disease that can be obtained only by the pursuit of those subjects that explain the structure and function of the body and the effect upon it of remedies and drugs. I believe it is quite unsafe, and professionally a crime, to give the remedy for a disease to a person who cannot make the diagnosis. This slogan has been ample protection against appeals from enthusiasts who have felt that all farmers should be told how to treat diseases. It is quite as easy to apply remedies in such a way that they will be as apt to kill as to cure. The empiric who gives a drug in one case because he has seen it do good in an-

other, of apparently the same sort, acts on the theory that similarity of superficial symptoms means similarity of lesions, which is, perhaps, as wild an hypothesis as could be invented.

In these days of great knowledge and high specialization there seems to be a lack of "a sense of the fitness of things." There seems to be an irresponsibility for the consequences of teaching. There are those who class themselves among educators who would have men, with very superficial knowledge of the nature of disease, teach live stock owners how to diagnose and treat their sick animals. You have seen, no doubt, some of the lists of maladies they feel teachers of agriculture can elucidate. The fact that such an idea could receive consideration in institutions of higher learning is evidence that modern, so-called higher education is on trial.

The educational propaganda that is doing most to break down veterinary medicine in the eyes of the public is the voluminous literature—circulars, bulletins, chapters in books on agriculture and magazine articles—telling farmers how to treat the diseases of their live stock, written by veterinarians themselves. These publications are responsible for the birth of the idea that untrained owners can treat disease quite as well as the veterinarian. These publications are largely the source from which teachers of agriculture in high schools obtain their information on veterinary subjects. The owner who is intelligent and trained in science and who wants to know how to diagnose and prescribe can obtain his information from recognized textbooks.

We Must Set Our House in Order

The veterinary profession of America needs first to "set its house in order." Its members should recognize more keenly their responsibilities and obligations to the public and the necessity of observing established ethical practices. Practitioners should garnish their technical work with humane treatment of their patients and wise and helpful advice to the owner. They should not be afraid of truth or of imparting it.

Of course, the veterinarian must advance in keeping with new knowledge and changed conditions under which he must function the same as a man in any other profession. His progress, however, is not restricted by the limitations of his Alma Mater. The personal equation is the strongest element. I do not hesitate to advise any prospective veterinary student that he should secure, if possible, a good education and then study veterinary medicine.

For the boy of high intelligence I should recommend a thoroughly hard university course. Many good men, however, do not see the vision and are not willing to pay the price that such a preparation costs. For many it is impossible and for others it is little less than a waste of time.

We are dealing, however, with the student body, not the individual. The two factors, namely, general education and technical training, should be balanced so that the latter supplements the first. It is not easy, in directing progress, to determine which to strengthen. Other professions have tried different methods. The lengthening of the technical curriculum by adding cultural subjects has not been a success. Psychologically, it does not fit. Students in such a course are not interested in general subjects. Their minds are centered on their objective, and other topics, as a rule, are considered by them as distractions. Human medicine has added two years of college work to its entrance requirements and a few schools require a Bachelor of Arts degree. This has done much to elevate the profession; also it is depriving the rural districts and small towns of physicians. After men have invested so heavily for their education, they feel that it is necessary to settle in larger places where they can recoup as specialists. As people are tending to live in cities, and town and county hospitals are being established, at least a partial adjustment in their case can be made.

Veterinarians Must Be Leaders

In veterinary medicine, however, the patients are on the farms in the rural districts and, for the greater part, they must be treated there. The veterinarian must go to his patients. There are many things for him to do besides treating the sick. He is the teacher of the community in matters of health and disease. Any system of veterinary education that tends to divert graduates from the country will defeat the purpose of the profession. We have many college graduates among our alumni and I cannot find one of them who is doing a general practice. They are specialists or holding positions of responsibility. Such men are wanted for leaders and I hope the number will increase rapidly. Again there is a civic and welfare significance attached to veterinary service. Few people seem to realize that the economic loss of animals from disease is followed often by privations, extending into suffering, on the part of their owners.

There is another condition in veterinary education today that must be considered. The veterinary colleges of this country are now public institutions, supported by taxpayers for the specific purpose of studying animal diseases and providing practitioners. If the colleges expect continued financial support from the people, they must do their part in providing efficient service for owners of live stock in the country. As a rule, the graduates who practice in the country come from the country and small cities.

In the circumstances, I believe it is wise to consider carefully any change at this time. It is clear that a definite program be adopted, along which advancement should be made. The experience of other professions suggests that additional educational requirements should be added to the entrance rather than to the technical course. Veterinarians need a good education to enable them to understand the live stock problems of their clients; they need it in making personal contacts; they need it most of all for its own sake, to make them bigger, better and more useful citizens. The country needs cultured veterinarians, men who "know the best that has been thought and said in the world" and who will put it into everyday practice —men who measure the value of their service by the help they give rather than the money they receive. Individuals, for generations of veterinarians, have given, not sold, their very best efforts.

Technical Course Now Long Enough

The length of the technical course is, for well-prepared students, quite long enough. With better preparation, it would be less difficult, and much-needed, additional subjects, such as the specific tests in diagnosis, poultry diseases, more thorough instruction in meat and dairy hygiene, could be given more consideration. The keeping of accredited herds free from tuberculosis and the elimination of Bang abortion disease are two tremendously important and new tasks for the veterinarian. I would favor a five-year course, which, for the present, should be made optional, in which the first year would be devoted to cultural subjects and basic sciences. Should this prove attractive and workable, the first year could be added later to the entrance requirements. It should be placed there for the convenience of the student who might advantageously take the preliminary academic work elsewhere. We must advance but we must keep

on the track. We must have in mind always the qualifications required to meet the demands of the community in which the practitioner is to live and the purpose of his work. The one condition of success, the sole safeguard of the profession, is "the moral worth and intellectual clearness" of the individuals who enter it. Education alone cannot give these but it may nourish them and bring those who possess them into the front, wherever and whenever they are to be found.

SAFE RAT POISON DEVELOPED

According to the *Official Record* experiments conducted jointly by the Bureau of Biological Survey and Chemistry of the U. S. Department of Agriculture have shown that a powder can be made from dried red-squill bulbs, which has an efficient and uniform toxicity for rats and at the same time apparently does not unduly endanger humans or domestic animals.

The use of powdered red squill for killing rats is comparatively recent in this country, although the poison has been in limited use in Europe for centuries. It has never come into popular use, however, even there because of its tendency to vary greatly in potency. Several of the factors influencing its toxicity have been developed during the course of the present investigation. Federal officials of the Department of Agriculture anticipate that these experiments will be of material assistance in the production of a uniform and stable squill product. This poison should greatly benefit poultrymen and farmers generally who hesitate to use various other rat poisons, on account of the possible danger to live stock.

NEW ROUNDWORM POSTER

A poster on "Roundworm Control and Better Pigs" has been prepared by the Bureau of Animal Industry. The new poster is 15 by 20 inches in size, printed on both sides. On one side, text and picture contrast a runty pig with healthy thrifty pigs. On the other side is an illustrated explanation of the life history of the roundworm. On one side is information in popular form, and the other gives information in scientific form, which is a new idea in the live stock literature gotten out by the Department of Agriculture. The poster is printed in two colors, on weatherproof stock. Copies may be obtained free, as long as the supply lasts, from the Bureau of Animal Industry, Washington, D. C.

SURGERY OF THE HEAD OF THE HORSE*

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A complete discussion of the surgery of the head of the horse would require more time on the program than it is possible to devote to this paper. I will therefore limit my remarks to a discussion of the conditions which occur most frequently and to certain methods in technic of operation which have been found to increase speed, accuracy, safety and efficiency in dealing with the conditions. For the sake of avoiding repetition In connection with the discussion of each operation, I would like to say in the beginning that it is my attempt always to do an aseptic operation, under some form of anesthesia. With this in mind, the general surface of the body is rendered as clean as possible, the field of operation shaved, dried, and painted once or twice with tincture of iodin, allowing the iodin to dry thoroughly before operating. The hands are prepared by thoroughly cleaning the finger nails, scrubbing with soap, water and nail-brush, and following this with an alcohol wash, followed by bichlorid of mercury 1 to 1000. The instruments are sterilized by boiling.

The anesthesia preferred is the administration by stomach-tube of one and one-half to two ounces of chloral hydrate in warm solution, thirty minutes before operation. This is sufficient to render the animal quiet under confinement. The anesthesia is completed by the use of local anesthesia, induced by using intradermal injections of the skin of the region, followed by infiltration of the underlying tissues which are known to be sensitive, such as the periosteum, and for dental operations blocking the superior or inferior dental nerve. The details of the technic and materials used were presented at the sixtieth annual meeting of the American Veterinary Medical Association, at Montreal, in 1923.[1] Thorough control of the animal is another essential to safe and efficient operation.

DISEASES OF THE BONES OF THE FACE

Fractures: Fractures occur as a result of collisions or falls. Fractures of the thin bones of the face, such as the frontal, lacrimal and malar, are usually not complete although there

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may be considerable displacement. In the treatment of these fractures do not attempt to remove loose portions too early, even though they seem to be quite completely isolated from the surrounding bone. Elevate the bone into the best possible position and allow the case to take its course. If portions of bone need to be removed, they can be removed later, when it has become perfectly evident that union will not take place. If sinuses are involved, drainage should be established.

Fractures of the mandible, which usually occur in the interdental space, are best treated by the application of a Lane's plate. To apply the plate, the skin and periosteum should be incised and retracted to expose the bone itself. The plate is then applied to the bone across the direction of fracture and held in that position by the use of screws. The holes should be started by the use of a small drill. After the plate has been applied the periosteum should be sutured over it by the use of catgut sutures and the skin wound closed with silk sutures, leaving drainage at the lower commissure. Usually the plate must be removed after healing of the bone has taken place. The animal should have a liquid diet as long as possible and later this should be changed to soft feed until healing has taken place.

Fractures of the body of the mandible, along the line of the symphysis, may be held in position by placing a long, slender, steel screw through the body of the mandible from side to side. To place the screw, withdraw the lower lip, incise the mucous membrane at a point below or beyond the incisor teeth, and drill a small hole transversely through the bone from side to side. The drill should be slightly smaller than the screw used. Proceed until the head of the screw is drawn down tightly against the bone and the fractured surfaces are brought into apposition. The screw may or may not be removed depending upon whether it becomes a foreign body or remains imbedded without causing iritation.

Tumors of the bone: Tumors affecting the bones of the face may be benign osteomas or malignant osteo-sarcomas or carcinomas. Osteomas are slow in growth and do not tend to involve the overlying mucous membrane or skin. They seem to cause no pain but may result in considerable enlargement. When not too large, they may be removed by dividing the skin or mucous membrane, leaving flaps long enough to cover the cut surface. Thoroughly expose the base of the tumor and cut it across with

a saw on a plane which will as nearly as possible restore the normal contour of the part. The cut surface should be cauterized with a hot iron or sponged with an astringent solution, such as tincture of ferric chlorid, to control the hemorrhage and establish a protective eschar. Suture the soft parts over the surface or treat the surface as an open wound.

It is not advisable to operate upon malignant tumors, unless they are small and well circumscribed.

Diseases of the Teeth

To be efficient in doing dental work, one must be forearmed with a working knowledge of the anatomy of the region and with the pathology and teratology which may be expected. He must possess also a dexterity which comes only with practice, and with powers of observation which can become discriminating and valuable only after making many comparisons. Some points which must always be in mind are:

First, always note the age of the animal, as it will determine the number of teeth that should be present, whether the ones in question are temporary or permanent, the length and direction of the teeth, and whether the wear is normal or excessive.

Second, be able to count the teeth, both by inspection and by palpation. This is done best by seeing or feeling the indentations between the teeth.

Third, be familiar with the size, shape and color of the table surface of each tooth, *and with the feel of the gums at their attachment* to the teeth. Many times a discoloration of the table surface of the tooth, open infundibuli and soft detached and retracted gums are the sole guides to disease of the alveolus.

The most common conditions affecting the teeth of the horse may be classified as follows:

1. *Congenital defects*
    a. Lack of proper cementation
    b. Failure of fusion of the dentinal plates
    c. Supernumerary teeth
    d. Misplaced teeth
    e. Odontomas
2. *Irregularities in wear*
    a. Sharp or enamel points
    b. Long teeth
    c. Shear-mouth
    d. Premature wear

3. Diseases of the tooth and alveolus

a. Caries
b. Tartar
c. Infection of the alveolus
d. Tumors of the alveolus

Congenital defects: Lack of proper cementation shows itself chiefly in the region of the infundibuli of the superior cheek teeth. The infundibuli, being improperly filled with cement, become packed with food which decomposes and breaks through the bottom of the infundibuli into the pulp cavity, causing acute alveolar periostitis. This condition, therefore, is an important cause of alveolar infection, but under our present methods is not treated of itself.

Likewise, failure of union of the dentinal plates in the formation of the tooth gives another path of entrance of infection from the table surfaces of the superior and inferior cheek teeth into the alveoli, resulting in fractures of the teeth along the lines of faulty union and in acute alveolar periostitis. The condition itself is not treated.

Supernumerary teeth occur both in the region of the incisors and the cheek teeth. A number of cases having seven or eight incisors, above or below, have been found in our clinic. Permanent supernumeraries must not be confused with retained temporary teeth. There is no indication for treatment unless some injury is being done and this is seldom the case. Supernumerary cheek teeth are of great practical importance. They usually occur posterior to the sixth cheek tooth, either in the upper or lower arcade. They are seldom opposed in wear and consequently soon produce injury to the opposite gums or hard palate. Aside from this injury, either the extra tooth or the sixth tooth in front of it, or both, may be loose and out of line. The diagnosis of this condition can be made only by palpation and this is one condition which impresses the great importance of the habit and ability to count teeth by palpation.

Never fail to go through the procedure of counting the teeth in every dental examination. Very rarely a supernumerary tooth will be found either medial or lateral to the other teeth, usually along the medial border and opposite the fourth or fifth cheek tooth. In case the teeth are solid, cutting the extra tooth from time to time, to prevent injury, is all that is necessary. In case the tooth is loose, it must be removed. As it is difficult to introduce extractors to a point beyond the sixth tooth, we

have in some cases been able to extract supernumerary teeth posterior to the sixth tooth, by grasping them with level cutters and using the cutters as extractors.

Under the heading of misplaced teeth we seldom find any conditions which call for treatment. Occasionally incisors are misplaced to the extent of being out of line with their fellows or rotated upon their long axis. Rotation a quarter turn has been noted in the fourth superior cheek tooth. If no injury is caused no treatment is necessary.

Odontomas, in one form or another, are quite common. They arise for the most part from the roots of the superior cheek teeth (fourth, fifth, or sixth) and extend into the sinuses. Sometimes they accompany the inferior cheek teeth and are encysted in the mandible.

The usual symptoms are: slow development of a non-inflammatory enlargement in young horses from one to five years of age. The enlargement has no previous history and no tendency to terminate in resorption or abscess formation, but continues to encroach upon surrounding structures, eventually causing dyspnoea, pressure necrosis and nasal discharge, when superior cheek teeth are involved. Percussion sounds over the enlargement are normal or even more resonant than normal.

In structure, odontomas may be either cystic, fibrous, or dentigerous, or any combination of these three. Their treatment calls for complete removal of the tumor tissue *and the tooth or teeth with which they are associated.* The removal of either element alone will not suffice.

Irregularities in wear: These conditions will not be discussed except to say that cutting long teeth is one of the most important corrective measures in dealing with this group. *In cutting teeth do not cut too near the gums on account of the danger of opening the pulp cavity which sometimes extends into the functional crown.* Advise yearly examination of the mouth.

Diseases of the tooth and alveolus: Dental caries is of little importance in equine dentistry as a primary condition. It does contribute toward breaking down teeth which are congenitally defective in structure. Fractured teeth result from carious processes in the infundibuli and between dentinal plates. The weakened tooth splits as a result of pressure in mastication and as food material wedges between the two portions they are pushed apart. The medial portion may do no harm but the lateral portion is often found lacerating the cheek, if not actually

imbedded in it. *Therefore, in examining teeth, never neglect to palpate the lateral borders even more carefully than the medial borders, as there is where the greatest damage is done by fractured and misplaced teeth.*

Tartar, which is always present to some extent, especially on incisors and canines, seldom leads to disease of the tooth or its alveolus, and will not be discussed.

Alveolar periositiitis is the most important dental condition. It exists in two forms, acute suppurative and chronic ossifying. The relative frequency of occurrence is shown in table I. In 222 cases of alveolar periostitis the superior cheek teeth suffered 148 times and the inferior ones 74 times. The condition was distributed among the teeth as shown in table I.

TABLE I—*Occurrence of alveolar periostitis*

TEETH	SUPERIOR	INFERIOR
First	18	5
Second	34	11
Third	32	12
Fourth	44	35
Fifth	18	8
Sixth	2	3
Totals	148	74

The extremes, of course, are the fourth and the sixth, but there is a surprising number of cases in the first, second and third. Out of 123 cases of known age, alveolar periostitis occurred in 53 before five years of age, 36 between five and ten years, and 34 after ten years of age.

The paths of entrance of infection are, in superior cheek teeth, through defective infundibuli, between dentinal plates, through breaks in the gum and through fractures of the bone. In inferior cheek teeth the infundibuli are absent.

The classical symptoms of suppurative alveolar periostitis, as found in any text, are: cautious mastication, lack of condition, offensive and characteristic odor, loosening of the tooth, swelling of the overlying bone and of the draining lymphatics. The diagnosis of early or slight cases is more difficult. In this connection, I wish to emphasize two additional symptoms. First, the significance of inflammatory enlargements of the bone overlying the roots of the tooth, even in young horses before the permanent tooth has erupted, as being good evidence of infection

of the permanent tooth; and, second, softness, separation and retraction of the gums from the affected tooth. This, in addition to diagnosing alveolar disease, also helps to choose which of two adjacent teeth is the diseased one.

The treatment is removal of the tooth, as soon as the diagnosis is established. Even though overlying swellings often subside and the animal seems to have made recovery, the tooth must be extracted eventually. As a result of neglect or delay, inflammatory new-growths often develop, to involve the sinuses or nasal cavity, in case of superior teeth, or produce dental fistula, in case of inferior teeth.

For either extraction or repulsion, the animal must be thoroughly controlled to prevent pain and to insure being able to carry out carefully and thoroughly what is necessary to be done. One of the chief factors for success in extraction is to have a suitable forceps. It must be low enough so that it can be introduced between upper and lower teeth, and strong enough so that it will take a firm hold and not slip upon the tooth. There should be no tendency to cut the tooth. The Williams forceps comes nearest to satisfying these conditions. The tooth should be thoroughly loosened in all directions before attempting extraction and then should be lifted and rotated at the same time, during extraction.

After extraction, the alveolus should be thoroughly cleaned out, explored for dentigerous processes, or small pieces of tooth or bone, and packed with gauze or cotton. If the alveolus communicates with a sinus it must be kept packed until healed enough to prevent food from entering the sinus. If it is not practical to change the pack daily, the alveolus may be packed with dental impression wax, heated in water until it is soft enough to be molded. The alveolus should be filled to the level of the gums and the wax riveted out upon the gums to prevent its being pushed through the alveolus. In a few minutes the wax hardens and remains in place until it is displaced by the healing process. Such a pack can be put in place as soon as granulations are well started in the cav ty.

When repulsion becomes necessary, the greatest factor toward success is the proper location of the trephine opening. A study of sculptured heads shows that the teeth of young horses are longer, of course, more curved or inclined backward from table surface to roots, and those occupying the sinuses have their roots nearer the median line than in old horses.

The first cheek teeth, superior and inferior, for all practical purposes, are straight; the sixth superior and inferior are markedly curved, while the other four, both superior and inferior, will all conform to one rule. Therefore, one simple rule will locate the roots of the first cheek teeth with respect to their table surfaces. Another simple rule will locate the roots of the next four; and the sixth, which is seldom repelled, is the only one which needs a special rule. Before applying the rules, establish what might be called the base line for all trephines, which, for superior teeth, is a line drawn from the medial canthus of the eye to a point just superior to the infra-orbital foramen and continued in this general direction forward past the first tooth. This line locates the position of the osseous lacrimal canal, which should always be avoided in trephining. The base line for the inferior teeth is the *lower, lateral* border of the mandible.

Rule 1: For the first cheek teeth. Trephine near the base line, at the point of intersection of it with a line drawn from the center of the table surface of the tooth.

Rule 2: For the next four teeth. Trephine near the base line, at the point where a line drawn from the *posterior border* of the respective teeth intersects the base line.

Rule 3: For the sixth superior cheek tooth. Trephine the frontal sinus on a line drawn between the medial canthus of the eyes and at a point 1 to 1½ inches from the median line. Pass a curved punch through the fronto-maxillary opening, and carry it, lateral to the infra-orbital canal, to the roots of the tooth.

Rule 4: For the sixth inferior cheek tooth. Draw a line from the center of the table surface of the tooth to the point of greatest curvature of the mandible. Divide the masseter muscle on this line and trephine the bone where palpation indicates the two plates of bone which form the mandible are separating to accommodate the tooth.

In horses past ten years of age, of course, it is permissible to drop down from the base line for superior cheek teeth and allow for a little less curvature. If these rules are followed, the punch will be at the roots of the tooth and in line with the long axis of it. Punching then becomes easy and all of the tooth is removed.

After repulsion, thoroughly clean out all diseased granulations, spicules of bone or tooth, and sponge out the cavity; then pack

FIG. 1. Sagittal section of the head, illustrating the method of draining the frontal sinus through the floor of the frontal portion of the dorsal turbinate bone.

to exclude the food. Cut off the opposite tooth and feed no hay for a few days. This applies particularly to treatment of the alveolus of the last three superior teeth.

Tumors of the alveolus are malignant and can not be successfully operated upon.

Diseases of Sinuses

1. Empyema
2. Tumors
   a. Odontomas
   b. True tumors

For the purposes of this article, the causes of these conditions are not important.

Empyema: The chief symptoms of empyema are intermittent, unilateral nasal discharge of pus, slight bulging of the bones overlying the sinuses, edema of the soft parts and pain on heavy palpation. The percussion sound is dull and there is either a history or a finding of some condition which might be expected to produce pus.

The treatment of empyema is drainage and the problem is to establish complete drainage. The frontal sinus is easily drained. To locate the field, place the thumb and the first finger of one hand on the nasal bones and pass the hand from below upward. Note the sudden bulge about the center of the region where the thumb and finger begin to separate from each other as they follow the outline of the nasal bones. Call this point "A," It marks the anterior limit of the frontal sinus and will be referred to later as point "A." At a point about two inches above "A" and one inch from the median line, trephine the bone. Pass the finger through the trephine opening, downward and forward to the anterior limit of the sinus. Pass a curved metal cathether or other instrument up the nasal cavity until it can be palpated by the finger through the wall of the frontal portion of the dorsal turbinate. Force the catheter through this wall into the sinus and use it to enlarge the opening enough to provide good drainage. It can also be used to pull a seton in place as the catheter is drawn out. Tie the ends of the seton together over the face. Such a seton will help to maintain drainage.

The frontal sinus opens freely into the superior compartment of the maxillary sinus. This sinus may be drained through the alveolus of the fifth tooth if that is removed or through the septum, between this portion of the sinus and the anterior compartment of the sinus. The anterior compartment of the

FIG. 2. Sagittal section of the head, showing the first method of draining the medial compartment of the anterior portion of the maxillary sinus through the floor of the ventral turbinate bone.

maxillary sinus is partially separated into a medial and a lateral portion by the plate of bone which rises from the floor to carry the infra-orbital nerve and, in young horses, the roots of the fourth tooth rise to the same height. The lateral portion may be drained through a trephine opening, placed in the angle formed by the facial crest and a line drawn from the end of it to the infra-orbital foramen; or it may be drained through the alveolus of the fourth tooth when that is removed. The medial portion, which must not be overlooked, is best drained by trephining near the line of the naso-lacrimal duct and passing a curved instrument through the ventral wall of the ventral turbinate, which is common to the sinus and the turbinate. This provides drainage into the nasal cavity.

Tumors: The most frequent form of tumor located in the sinuses is the odontoma of either the cystic, fibrous or dentigerous type, as referred to above. True tumors may occur, especially the malignant varieties.

The prognosis of operation upon tumors depends upon the size and nature of the process. The condition should be operated upon early, if at all. We have returned to usefulness a number of cases in which both the maxillary and frontal sinuses have been involved. Some have been largely cystic, others chiefly fibrous, with some bony tissue inlaid, and others have been chiefly dentigerous. Our clinic has had one case which contained 90 separate teeth or dental fragments located in the maxillary sinus and in the hard palate, in the region of the fifth cheek tooth, and our museum contains one in which 431 such bodies were contained in a cyst of the mandible.

In removing tumors from the sinuses, the chief factor toward success is liberal trephining at as many points as will facilitate the removal. Begin by making the first opening into the deepest portion of the superior compartment of the maxillary sinus, about 1 to 1½ inches anterior to the orbit. Palpate through the opening to determine the extent and direction of the tumor and make a second opening adjacent to the first in the direction of the greatest extent of the tumor. With chisel, cut out the bone between the trephine openings. This affords an elongated opening which is much more useful than a round opening. Repeat this operation over the inferior compartment, or the frontal sinus if necessary. Most tumors separate off the sinus wall quite easily. For this purpose use a curet, chisel, or curved scissors, and remove the tumor masses with forceps. The

lacrimal duct is to be avoided in trephining, and the infra-orbital canal and roots of healthy teeth avoided within the maxillary sinus.

Surgical Diseases Within the Nasal Cavities

1. Tumors encroaching from the sinuses.
2. Tumors and cysts of the turbinate bones.
3. Necrosis of the turbinate bones.
4. Tumors, abscesses, hematomas and chronic chondritis of the nasal septum.

Tumors: Tumors and cysts encroach from the sinuses into the uncoiled portion of the turbinate bones, or through the maxillary plate, from the roots of the anterior cheek teeth. We have had one case in which a well-formed molar tooth was contained within the ventral turbinate and one large myxofibroma, involved the inferior turbinate, at the base of which was a spicule of bone which in some way had been raised up from the lateral wall of the nasal cavity and furnished a source of irritation. The end of the tumor mass had been removed a number of times but always recurred, until the entire mass, including the bone spicule, was removed.

Necrosis of the turbinates: Necrosis usually results from poorly drained empyemas of the sinuses or from the presence of foreign bodies or tumors. As a rule the process sloughs through the uncoiled portion. After drainage has been established with the nasal cavity, either by the process or by surgical means as discussed under diseases of the sinuses, the process heals without attacking the coiled portion. If the coiled portion becomes involved in necrosis or tumor formation, it must be removed.

Operation: Administer chloral hydrate, perform tracheotomy and pack the pharynx. Trephine the nasal bone under local anesthesia, just anterior to the point "A" referred to above and far enough from the median line to avoid the septum. Make a second opening an inch anterior to the first and cut out the plate of bone between the two. Cut the cartilaginous anterior end of the turbinate loose from its attachments anteriorly and with a long-handled chisel, which is guarded on both corners, cut the attachment of the bone from the lateral wall of the nasal cavity. Divide the turbinate transversely at the height of the first trephine opening and remove the whole structure. Pack the cavity with gauze and release the animal as soon as possible. Hemorrhage soon ceases after the animal regains its

feet. This is the chief reason for not using chloroform anesthesia.

Diseases of the nasal septum: Diseases of the nasal septum include abscesses during attacks of colt distemper, seromas resulting from bruises, tumors involving the anterior end of the septum and nasal margins, and chronic thickening of the septum, resulting from any of these conditions or from blows on the end of the nose which involve the cartilage primarily. Any of these conditions may result in narrowing the passageway and permanent dyspnea. We have always found these conditions existing anterior to the point "A" referred to above and therefore we have developed the following operation for removal of the septum when it is obstructing breathing.

Removal of the nasal septum: Secure the animal upon an operating-table, perform tracheotomy, pack the pharynx and anesthetize or delay general anesthesia until the trephine operation has been completed. Thoroughly shave and prepare the nasal region from the boundary (anterior) of the frontal sinus forward. Trephine into the nasal cavity by placing the trephine upon the median line at a point where the fingers begin to diverge from each other when passed backward over the dorso-lateral surface of the nasal bones (point "A"). This point marks the lower limit of the turbinal portion of the frontal sinus and will be found to be almost exactly at the same height as the posterior border of the hard palate, which is the best height at which to cut the nasal septum transversely. Trephine through the bone only, without wounding the mucous membrane and the accompanying submucous artery which, if wounded, results in disagreeable hemorrhage.

Trephine a second time on the median line, about one inch anterior to the first one, and remove the bone between the two openings. To operate with the least hemorrhage, it is advisable to pack the nostrils with gauze saturated with adrenalin chlorid 1-3000, or paint the septum with the same. Inasmuch as the vessels of the septum are in the mucosa and submucosa, they can be markedly constricted by a surface application of adrenalin and the hemorrhage greatly lessened during operation. It can also be greatly controlled by inserting a pair of long compression-forceps through the mucous membrane, astride the septum at the superior border of the first trephine opening, and clamping the septum firmly, just posterior to the plane at which it is to be divided transversely.

Operating within the nostril, with a sharp bistoury, cut the

FIG. 3. Special instruments used in removing the nasal septum.

septum transversely, using a semicircular incision, following the attachment as near its anterior extremity as possible but leaving sufficient cartilage to support the alae of the nostrils. Secure the cut end in a pair of tumor forceps, place a narrow, long-guarded chisel astride the septum and push it along the superior wall of the nostril, cutting the septum from the nasal bones back to the height of the first trephine opening, or until the chisel comes in contact with the compression forceps. Withdraw the chisel and insert it in the same manner along the floor of the nostril, cutting the septum free from the vomer, back to the posterior border of the palatine bone or in contact with the compression forceps. With scissors or narrow chisel inserted anterior to and in contact with the compression forceps, divide the septum transversely and remove it through the nostril, either entire or further divided, as may be necessary. Tightly pack the nasal cavity with gauze, take the pack from the pharynx and release the animal.

The operation should preferably not be performed upon animals under four or five years of age, on account of the danger of collapse of the nostrils. The operation should be so planned as to delay the division of the septum until every other step has been taken, in order to postpone the hemorrhage. The after-treatment consists in sponging away the discharges until healing takes place. Feed the animal from the floor to facilitate drainage.

Diseases of the Eye

1. Wounds of the lids and cornea.
2. Entropion and ectropion.
3. Foreign bodies.
4. Tumors.

The treatment of the first three conditions involves no special problems which have not been well discussed in texts.

Tumors: Practically all tumors affecting the mucous membrane, third eyelid or orbit are malignant tumors, either carcinomas or sarcomas, and consequently their removal must be early and complete to be successful. Tumors which are small and well circumscribed at the base, or which involve a structure like the third eyelid, which can be completely removed, require only thorough extirpation. The operator must keep the line of incision well beyond the tumor tissue and he is guided in making the incision chiefly by the sense of touch. Many times a tumor

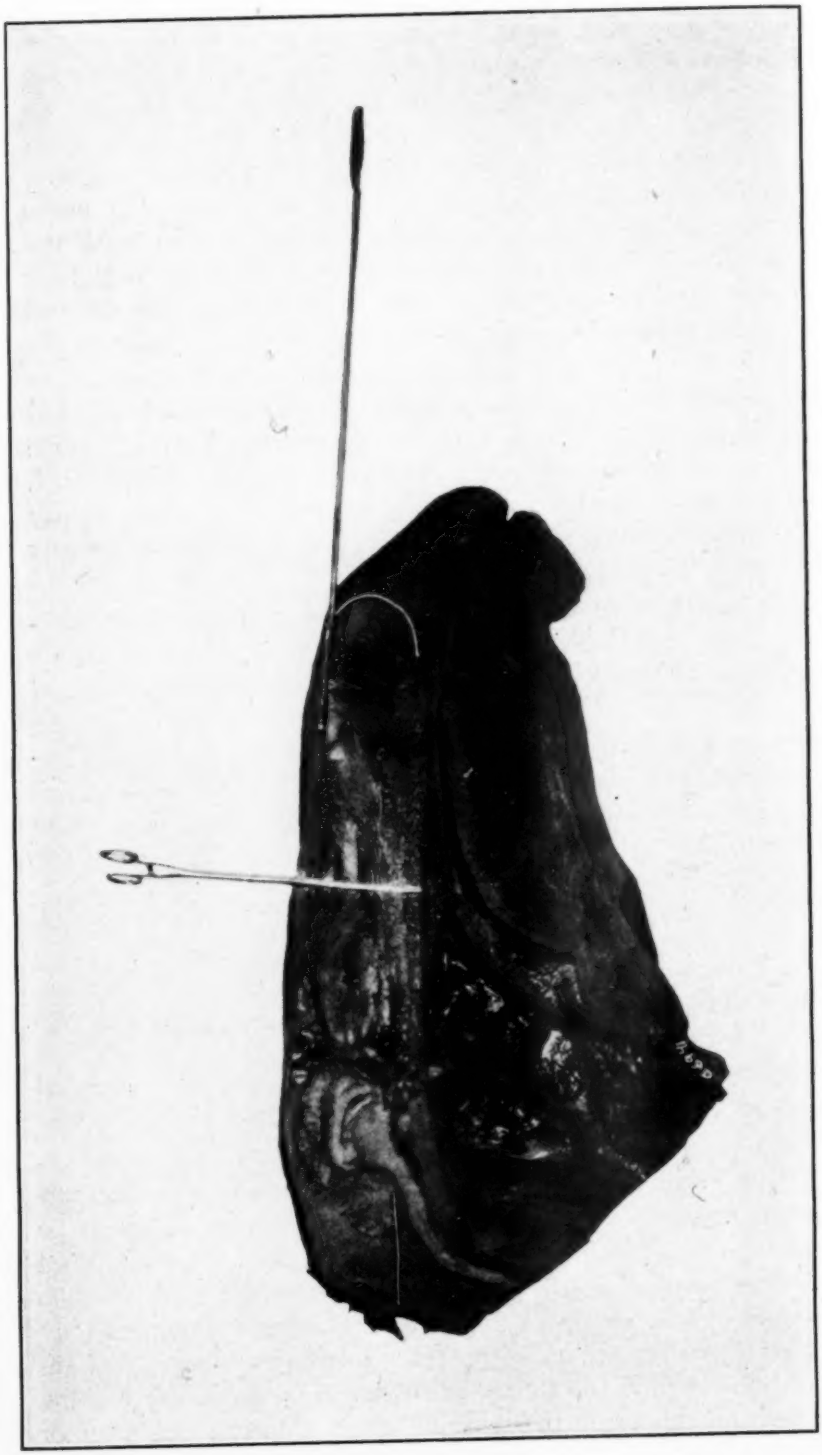

FIG. 4. Sagittal section of the head, showing how the septum is removed.

which is small and seemingly not extensive from superficial examination, is later found to extend deeply into the orbital cavity, between the orbit and bone, where the deepest portion can not be reached. Such cases and those involving the orbit itself require extirpation of the orbit.

Operation: To perform the operation, confine the animal on the table or ground and carefully remove, by shaving, the hair of the lids and surrounding area and paint the surface with tincture of iodin. With a small hypodermic needle, inject subcutaneously and intradermally a liberal amount of local anesthetic, such as a 2 per cent solution of stovaine, apothesine, or procaine, containing adrenalin chlorid in a 1 to 5000 solution, into the upper and lower lids, about one centimeter from the border of the lids. Follow this by injecting about two cubic centimeters of the same solution at each of four different points into the depths of the region posterior to the orbit.

Suture the upper and lower lids together with a continuous silk suture, fix the skin of the lids with tissue forceps and, with a very sharp knife, make an incision through each lid, about one-fourth inch from their borders, uniting the incisions the same distance beyond the lateral and medial canthi. The incision should pass to, but not through, the conjunctiva. The hemorrhage should at all times be carefully controlled so that this technic may be carried out after completing the incisions to a uniform depth throughout their extent. The conjunctiva is separated from the lids back to its attachment to the orbit. This leaves the conjunctiva attached to the border of the lids which have been sutured together and these tissues may then be used to apply traction upon the orbit. After the dissection has been carried back to the point of insertion of the conjunctiva to the orbit, the muscles of the eye are clipped with a pair of curved scissors and finally the optic nerve is cut in the same manner and the orbit completely removed, the third eyelid being removed with it.

All of the periorbital fat should be left in place. The hemorrhage which is not great should be controlled with sterile gauze sponges and all blood-clots removed from the cavity. The cavity is then packed with sterile gauze, dusted with equal parts of chlorinated lime and boric acid, well mixed together, or iodoform, and the cut edges of the lids carefully sutured with interrupted silk sutures from the external angle, omitting the last stitches to provide drainage. Remove the pack in twenty-

four hours and inject into the cavity about one-half ounce of "bipp," which is a paste composed of iodoform, bismuth subnitrate and liquid paraffin in the following proportions:

Iodoform	16 oz.
Bismuth subnitrate	8 oz.
Liquid paraffin	8 oz.

Very little after-treatment will be found necessary. The cavity will fill and the edges of the lids become permanently healed together in about two weeks. The area is finally left somewhat sunken but the surface is absolutely smooth and no discharging wound remains.

Dentigerous Cyst of the Temporal Bone (Fistula of the Ear)

This condition consists of two portions, a dental base and a dermoid tract. The dental portion consists of a molariform tooth, situated in a rudimentary alveolus in the temporal bone near the base of the ear. The dermoid portion consists of a tract leading from the dental portion to the exterior. It may be directly over the tooth or a distance of three or four inches from it, opening along the anterior free border of the conchal cartilage. The chief symptoms are the presence of the tooth, which can be palpated under the skin, and the discharge of a viscid, straw-colored fluid from the fistulous opening. It is chiefly the presence of the discharge which makes operation desirable.

Operation: Make an incision throughout the length of the dermoid tract, laying it open from beginning to end, and continue the incision over the tooth far enough to allow the tissues to be retracted until the base of the tooth can be clearly exposed. With chisel or forceps lift the tooth from its alveolus and smooth the edges on the alveolus. Dissect the lining of the entire tract from the surrounding tissues so that fresh wound-surfaces remain. Suture the skin throughout the length of the incision, leaving drainage at the lowest point. If there is hemorrhage to be controlled, pack the small cavity with sterile gauze for twenty-four hours. Cover the line of incision with a collodion dressing and little after-treatment will be necessary, following the removal of the gauze. Removal of either portion of the process alone is not sufficient to bring about permanent healing.

REFERENCE

[1]Bemis, H. E., Guard, W. F., and Covault, C. H.: Anesthesia, general and local. Jour. A. V. M. A., lxiv (1924), n. s. 17 (4), pp. 407-439.

A RAPID METHOD FOR PERFORMING THE AGGLUTINATION TEST IN THE SERUM DIAGNOSIS OF BANG'S ABORTION DISEASE IN CATTLE*

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The gradually increasing scale on which serological procedures are being conducted in the diagnosis of both human and animal diseases has called forth the development of rapid methods to replace the slow but fairly accurate methods now practiced. The investigations of this nature have centered chiefly around the diagnosis of syphilis by means of a precipitation procedure. While much groundwork has come from investigators in Europe, it remained for Kahn[1] to develop a rapid procedure to such a degree of practicability and accuracy that its supplanting of the Wassermann or complement-fixation reaction for diagnosis of syphilis is not far off.

Other rapid methods have been developed for detecting the inciting agent of a disease, such as in poliomyelitis,[2] and for differentiating types of pneumococcus in epidemic pneumonia. As regards the detection of specific substances in the diagnosis of infectious diseases caused by bacteria, the rapid macroscopic method developed by Noble[3] is historic in its nature. The results reported by her were so striking that we were led to the study of a similar method for the serum diagnosis of Bang's abortion disease. Such a test properly conducted would materially reduce the time now required to perform to completion the present agglutination test and furthermore make possible its application in the field by properly instructed veterinarians.

In order to determine the accuracy and practicability of a rapid agglutination procedure, and to compare it with the results of our present slow method, it seemed to us that it was highly desirable that the different amounts of serum used in both methods should correspond. That is, if we conducted the rapid procedure, using varying amounts of undiluted serum, the amounts should be identical with those used to obtain the various dilutions in the slow procedure.

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In this case we employ 0.08, 0.04, 0.02, 0.01 and 0.005 cc of serum in two cubic centimeters of the standardized antigen to obtain approximate dilutions of 1-25, 1-50, 1-100, 1-200 and 1-500. The same amounts of undiluted serum were used in the study of the rapid-agglutination method.

Instead of diluting the serum with phenol-saline solution containing *Bacterium abortus*, the organisms were concentrated, and small, constant amounts added to each tube containing undiluted serum. Preliminary tests were quite successful in detecting serum agglutinins for *Bact. abortus* in guinea pig and rabbit sera, but with bovine sera there was a considerable discrepancy between the results of the rapid and slow procedure. The flocculation of the antigen took place rather slowly in some cases and was altogether absent many times when there was complete agglutination in the slow method. Also, there was a tendency for many strongly positive sera to show "zone" flocculation.

Highly Sensitive Antigen Developed

Reasoning along the line of well-established principles governing the flocculation of bacteria by specific sera, it was thought that by further increasing the concentration of the antigen without further dilution, "zone" reactions would be eliminated. Further, reducing the electrical potential of the antigen by increasing the concentration of the salt solution would tend to hasten flocculation on the addition of serum containing the reacting substances. So, by varying the concentration of the antigen, as determined by the Gates' apparatus or nephelometer, and the concentration of the salt solution, an antigen was arrived at which was highly sensitive to flocculation when brought in contact with sera containing specific agglutinins, and when compared with the slow method against the same sera the results were just as accurate and the titer of agglutination in both cases was the same.

The procedure for the preparation of the antigen and performing the test is as follows:

A single strain of *Bact. abortus* is grown on beef-liver-infusion agar in Blake bottles for 48-72 hours. At this time the luxuriant growth is removed with a solution containing 12 per cent sodium chlorid (C. P.) and 0.5 per cent phenol. A heavy suspension of the organisms is desired, so care should be taken not to use too much salt solution in removing the growth. The suspended organisms are filtered through absorbent cotton to remove pieces

of culture medium removed with the growth. The suspension is now carefully standardized with the Gates nephelometer to a density of 4 millimeters. Those who are familiar with the Gates nephelometer will readily realize that this measurement represents a very dense suspension of the organisms. The pH is adjusted to 6.8 in order to obtain the greatest speed of flocculation. The antigen is very stable and may be kept at room temperature for a considerable length of time. In making the test proper it has been found that between 0.03 and 0.05 cc of the antigen gives the optimum results for all agglutinating sera, whether they be of a high or low titer.

The sera before testing should be brought to room temperature (65°-70° F.) and likewise the tubes in which the test is to be performed. Cold retards the clumping of the antigen to a considerable degree. At the present time the test is being conducted with five different amounts of serum, namely, 0.08, 0.04, 0.02, 0.01 and 0.005 cc, which are the amounts used in the slow test. To each tube of undiluted serum is added 0.04 cc of previously standardized antigen, using a standardized capillary dropper-bulb pipet. The serum and antigen are mixed by vigorously shaking the rack containing the tubes for ten seconds. Flocculation of the antigen will be complete at the end of the shaking in most cases in which serum agglutinins are present in considerable amount. There are, however, sera occasionally encountered which appear to clump the antigen slowly. So a practice is made of again shaking the tubes five minutes after the first time, and tabulating the results fifteen minutes from the time of mixing.

Two Methods Compared

The two methods—the rapid and the slow—have now been compared on 2000 samples of bovine sera and the results are identical in 100 per cent of cases where clumping was complete or incomplete in 0.04 cc or less of serum. We often find a serum clumping the antigen slightly in 0.08-cc amounts by the rapid procedure, when there is no macroscopic clumping in this dilution by the slow procedure. However, when 0.08 cc of serum caused complete clumping in one, clumping was likewise complete in the other. When flocculation does occur, it is very sharp and distinct as contrasted with the absence of flocculation. Slanting the tubes in order to obtain a thin film of the fluid may facilitate the reading of the results, but this operation is not absolutely necessary.

We are convinced that the described rapid method is just as accurate as the present slow-agglutination method for the serum diagnosis of Bang's abortion disease in cattle. Further, there is considerable time and labor saved in performing the test. The rapidity with which the results may be returned to the cattle-owner, especially when animals are bought and sold or shipped interstate, are items which make its use highly desirable and to be preferred over the slower method.

Recently, Moore has suggested that qualified veterinarians take up the practice of performing the serological test in the field, since it is now far out of the experimental stage. The rapid-agglutination method can easily be performed by veterinarians after sufficient instruction in its operation. In fact the results of the test are less difficult to read than are the results of a tuber-

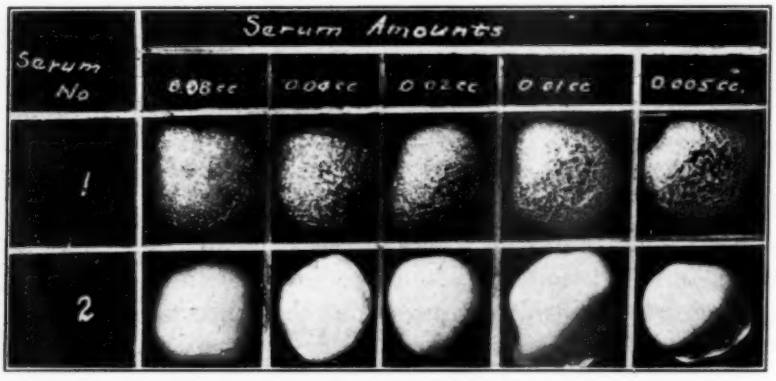

FIG. 1. Occurrence of flocculation in positive serum (1) and its absence in a negative (2) serum.

culin test. The only equipment needed are a few standardized dropper pipets and ordinary 5-cc vials, such as are commonly used for the collection of blood samples. Agglutination tubes such as are used in the laboratory are not necessary.

The rapid-agglutination method has also been employed by us in the serum diagnosis of undulant fever in man in a limited number of cases. The results in every case confirm those of the slow-agglutination method.

AUTHORS' NOTE

Since the presentation of the above paper, considerable improvement has been made in the technic of performing the test. The flocculation is more distinct and the time allowed for the completion of the reaction greatly reduced.

Glass plates are substituted for the tubes. The plates are ruled off in inch squares and should be of a size to hold the five amounts of serum from several samples. After the serum and antigen are placed in the squares on the plate, they are mixed by means of a tooth pick.

Flocculation begins immediately after mixing and is complete in less than five minutes. The plates should be slightly warmed after mixing. The reading of the results is facilitated by a reflected light against a black background. Figure 1 illustrates the occurrence (serum 1) and absence (serum 2) of flocculation in the five concentrations of serum used.

BIBLIOGRAPHY

[1]Kahn, R. L.: Serum Diagnosis of Syphilis by Precipitation. (Baltimore, Md., Williams & Wilkins Co., 1925.)

[2]Rosenow, E. C: Further studies on the poliomeylitis precipitation reaction. Presented before the 27th annual meeting of the Society of American Bacteriologists, Dec., 1925. (To be published.)

[3]Noble, Arlyle: A rapid method for the macroscopic agglutination test. Presented before the 27th annual meeting of the Society of American Bacteriologists, Dec. 1925. (To be published.)

[4]Gates, Frederick L.: A method of standardizing bacterial suspensions. Jour. Exp. Med., xxxi (1920), p. 105

O. S. U. RADIO PROGRAM

The members of the faculty of the College of Veterinary Medicine, Ohio State University, have inaugurated a series of radio addresses for the 1926-1927 season. These addresses are broadcast by station WEAO, Wednesday evenings, at 8:00 p. m.

During the month of October the following addresses were given:

October 6. "Progress of Veterinary Education," by Dr. O. V. Brumley.

October 13. "The Value of the Veterinarian to the Community," by Dr. D. S. White.

October 20. "The Prevention of Live Stock Disease," by Dr. J. H. Shoemaker.

October 27. "Diseases Man May Contract from Animals," by Dr. L. W. Goss.

Two addresses will be broadcast during November, as follows:

November 3. "Army Veterinary Service," by Capt. E. F. Long, V. C., U. S. Army.

November 10. "Uses of Animal By-products," by Dr. D. W. Ashcraft.

The program will be resumed in January and a list of the addresses to be given during the months of January and February will be published in the January issue of the JOURNAL.

DESCRIPTIVE IDENTIFICATION OF CANINES AND FELINES*

By J. G. HORNING, H. E. KELLER, A. J. MCKEE *and* K. K. SMITH, *Houston, Texas*

You possibly have heard the old proverb, "The leopard can not change his spots." Believing the same to be true with canines and felines, we have devised the following system to be used in their identification. The purpose of this method of identification will be to allow one to classify properly and file numerically dogs and cats of all types, according to their respective markings.

First we will divide the body of the dog or cat into eight zones, or sections, viz:

	Section or Zone	*Numerical Value*
1	Entire left fore leg	1
2	Entire right fore leg	1
3	Entire head and neck	2
4	Entire back	2
5	Entire left hind leg	4
6	Entire right hind leg	4
7	Entire abdomen and chest	8
8	Entire tail	8

Each of these zones or sections will have a numerical value, as shown above. The reason for this will be shown later.

Possibly a dog or cat marked as follows might be brought in to be examined and classified:

	Section or Zone	*Numerical Value*
1	Brown spot on left fore leg	1
3	Brown spot on head	2
5	Brown spot on left hind leg	4
8	Brown spot on tail	8

His classification could be coded, with reference to sections or zones, as follows:

Section or zone	1	2	3	4	5	6	7	8
Numerical value	1	0	2	0	4	0	0	8

By beginning with the first space of the eight zones and adding every other number in the respective spaces we get a total of 7, which will be our denominator. By beginning with the second space of the eight zones or sections and adding every other number we get a total of 8, which is our numerator. This would give this particular dog a general classification of eight over seven.

*Presented at the sixty-third annual meeting of the American Veterinary Medical Association, Lexington, Kentucky, August 17-20, 1926.

Now in order to give a proper classification to dogs of solid colors, having no marks or spots, we will just put them in a class by themselves, namely, one over one (one being the numerator and one being the denominator). Adding this one over one, as explained above, to our first class we find that this dog's authentic classification would be nine over eight.

The reason for not giving the same number to the valuation as to the respective sections is as follows: If a dog had spots in sections two and three, it would give us a total of five, while one spot in section five would have the same numerical value. Under our system, a spot in sections two and three would have a numerical value of three, while a spot in section five would have a numerical value of four, making it impossible for any two sections or any one section to have the same numerical value as any others.

Possibly you may ask what we are going to do to classify properly the dogs covered with spots. This would be equivalent to having spots in every section, or zone, of the body and would be coded accordingly, or it would give them a classification of nine over nine. Under this system, we would have from one to nine for the numerator and from one to nine for the denominator, giving us a total of 81 general classifications.

Under these 81 general classifications we would have cards bearing the following information: Name of dog, owner, residence and phone, sex, breed, color of mouth, tongue, hair (straight, wire, curly), eyes (both left and right), age, height, weight, tail (cut off or long), colors, sire, dam, teeth and infirmities (such as deafness, etc.), and a description of any operation or other scars visible. Supplementing this would be a sketch of the dog, both top and bottom sides, with the respective markings, scars, etc., drawn therein, together with an impression of his nose and possibly a photograph having his Kennel Club registration number above his body at time the photograph was made.

Such a description would be conclusive evidence in case of any argument and the impression of his nose would be infallible. This system would work equally as well on a brown dog, having white spots or marks, as on a white dog, having brown marks or spots.

In the event of there being any difficulty in determining what particular zone a marking is in, the operator may classifiy it according to the zone he believes it to be in, and reference it in the zone in question, making a duplicate card and filing it in

the class of the reference, with notations thereon relating to the original card's class.

With the above 81 general classifications, we could segregate the classifications, according to sex, which would give us a total of 162 divisions. Allowing that there are ten different colors of dogs and segregating them accordingly, this would give us a total of 1,620 divisions in our files. Granting that there are twenty distinct breeds of dogs, and segregating them accordingly, this would then give us a general classification having 32,400 distinct divisions, exclusive of many of the things showing the exact description of the dog in question on his respective filing card.

In the event of a dog having a spot on his tail (this having a definite meaning under our system of classifying) being stolen and his tail cut off, it would handicap us to a certain extent, so to protect ourselves, when searching our files for such a dog, we will search for him just as if he had a tail with a spot on it and also search under and give him the classification that he would have without a tail.

The same rule can apply to trimmed ears. The operator can search for such dogs both under the full-ear and the trimmed-ear descriptions. This would not make any difference under our system of classification, but the operator would naturally read the descriptions of all dogs having a classification similar to this dog.

As this system requires that all description cards be filed behind their respective guides, naturally, we must devise a system whereby we can find a desired dog's description other than by looking through all the cards in our file. The solution to this would be a 3x5 index card, filed under either the name of the dog or the owner. On this card possibly would be the sex, color, breed and classification, age, etc. Without this card, were a dog stolen, it would be impossible to get his proper description other than by looking through the whole classification file. Possibly the original card often may be referred to as a health record.

The cards for all male dogs are to be printed in black ink, while those for the females are to be printed in red, both being the same form. A color scheme might be used to segregate the various breeds, viz: Yellow cards could be used for all police dogs; red cards for all setters, green for pointers, etc. This color scheme assists materially in locating cards wanted, as it greatly increases the visibility.

The back of the card could have two spaces for photographs of both sides of the dog. The rest of the space could be lined and used as a record for transfers, health, prize winnings, etc.

DISCUSSION

DR. A. J. STEINER: Instead of this system of classification, what would be the objection to tattooing?

DR. HORNING: Quite a few people refuse to have a dog tattooed.

DR. J. C. WRIGHT: What is your fee?

DR. HORNING: $2.50.

DR. WRIGHT: Do you keep a file or give it to the owner?

DR. HORNING: I keep it in the office, and give the owner a copy if requested.

DR. H. W. BROWN: In the Pacific Northwest where the silver for industry is rather extensive, they are using the tattoo on the ear and there is more money invested in foxes ordinarily than there is in the common run of dogs, or even in registered dogs. There is seldom a fox that is not worth at least $500.00 The breeders are using the tattoo in the ear and it is registered with the Fox Association. Would not that and the nose-print be a definite classification of the dog?

DR. HORNING: They can always trim the ears, you know.

DR. BROWN: That would depend altogether on the breed of dog. If it is deep-seated enough they would be compelled to take off all the ear and not very many would take a dog like that.

DR. C. R. WALTER: We have at this time, although not very active, the American Sportsmen's Protective League and each League has its own number. The secretary has a tattoo outfit which he is always glad to turn over to the veterinarian to tattoo dogs. Sporting dogs are tattooed in the left ear and in the flank. There is no occasion to cut their tails or trim their ears. We have been able to recover dogs that were shipped thousands of miles by this tattoo number. For instance, Tulsa's number would be A460. Lexington's number would be A570. No two towns have the same number. I think it would be a great thing if each man would stimulate one of those protective leagues in his own locality. Then if a dog is stolen there is the Sportsmen's Protective League to help to recover it.

I think the fee now is $1.00 for men to join this League and then 25 or 50 cents a head for tattooing each dog. If a party is caught with the dog, every Protective League in the United States is notified, and this fellow's whole history given, how he got this dog and so on and if that fellow steals another dog it is only a short time until he is sent over the road. I will just mention one instance. I had a valuable dog that was lost for two weeks. This dog disappeared one night, out of my driveway. I advertised for two weeks, with no success. I offered $25.00 reward for him in the next Sunday's paper. We had him two hours after the paper came out. I went to this fellow's home to get the dog and I asked him how long he had had the dog. He said only about fifteen minutes. I asked him for his name and address. It was turned over to the Protective League and his name was published in every city of the United States. He fell to pieces, and that fellow will never steal another dog.

FREQUENCY OF CALVING OF PHILIPPINE COWS

Professor Valenti Villegas, in *The Philippine Agriculturist*, gives the average interval between calvings for 193 cows as 369.6 days. The average rest period, that is, the time elapsing from the last calving to the beginning of the next pregnancy, was 89.6 days.

N. S. M.

Nobody enjoys loafing like the man who works for it.

CLINICAL AND CASE REPORTS

(Practitioners and others are invited to contribute to this department reports of unusual and interesting cases which may be helpful to others in the profession.)

IMPACTION OF THE COLON IN A DOG

By GERRY B. SCHNELLE, *Angell Memorial Hospital, Boston, Mass.*

A French bull dog, male, about six years old, was brought to the hospital with a history of poor appetite, absence of bowel movements and gradually increasing emaciation. The dog was slightly icteric and very weak, but presented no other marked symptoms. Palpation of the abdomen revealed a large, hard

FIG. 1. Impaction of the colon.

object which completely filled the posterior part of the abdominal cavity.

On being questioned further, the owner admitted that, to his knowledge, the dog had not had a bowel movement for five weeks. At the owner's wish the patient was destroyed, and an autopsy revealed the impaction shown in the accompanying illustration. The mass extended from the terminal portion of the ileum, including the cecum and colon, to the rectum. The

fecal matter was dried out, very hard and black. The small intestine showed slight catarrhal inflammation, the gall-bladder was distended and the kidneys showed chronic interstitial inflammation.

When removed from the body, the impacted mass weighed five pounds, nine ounces. What would appear to be unusual was the fact that the animal had not vomited, and apparently had little or no pain.

CONGENITAL DIAPHRAGMATIC HERNIA

By JOHN G. HARDENBERGH,

Division of Experimental Surgery and Pathology,
The Mayo Foundation, Rochester, Minnesota.

A black and tan fox terrier, one year old, while being operated on under ether anesthesia, stopped breathing and efforts to revive him were unsuccessful.

At necropsy a roughly circular opening, 5 cm. in diameter, was found in the right half of the diaphragm, midway between the superior and inferior borders of that muscle. Through this opening five feet of the small intestine and the caudate and right lateral lobes of the liver had been transposed into the right pleural cavity (fig. 1). The heart was displaced to the left and the right lobes of the lung were atelectatic. The edges of the opening in the diaphragm were rounded, smooth and thickened. There were no adhesions nor other evidences of previous injury to abdominal organs or to the ribs. The size and shape of the hernial ring and the transposed lobes of the liver which had the appearance of having developed along the posterior mediastinum were indications of the congenital nature of the condition, as any injury sufficient to produce it would probably have caused the death of the animal. The dog's history was not known but during the time the animal had been under observation no symptoms suggestive of the abnormality were noted. There were no signs of chronic obstruction in the gastro-intestinal tract, and the wide-open hernia rendered such obstruction unlikely.

Comment: Diaphragmatic hernias cannot always be accurately classified as congenital, acquired or traumatic, unless, in case of the latter, there is a history of injury coincident with the onset of symptoms. In a series of several thousand animals

examined, this was the only one with the congenital type of hernia; but those due to trauma are not rare. Diaphragmatic hernia may be suspected when any dog that has been run over

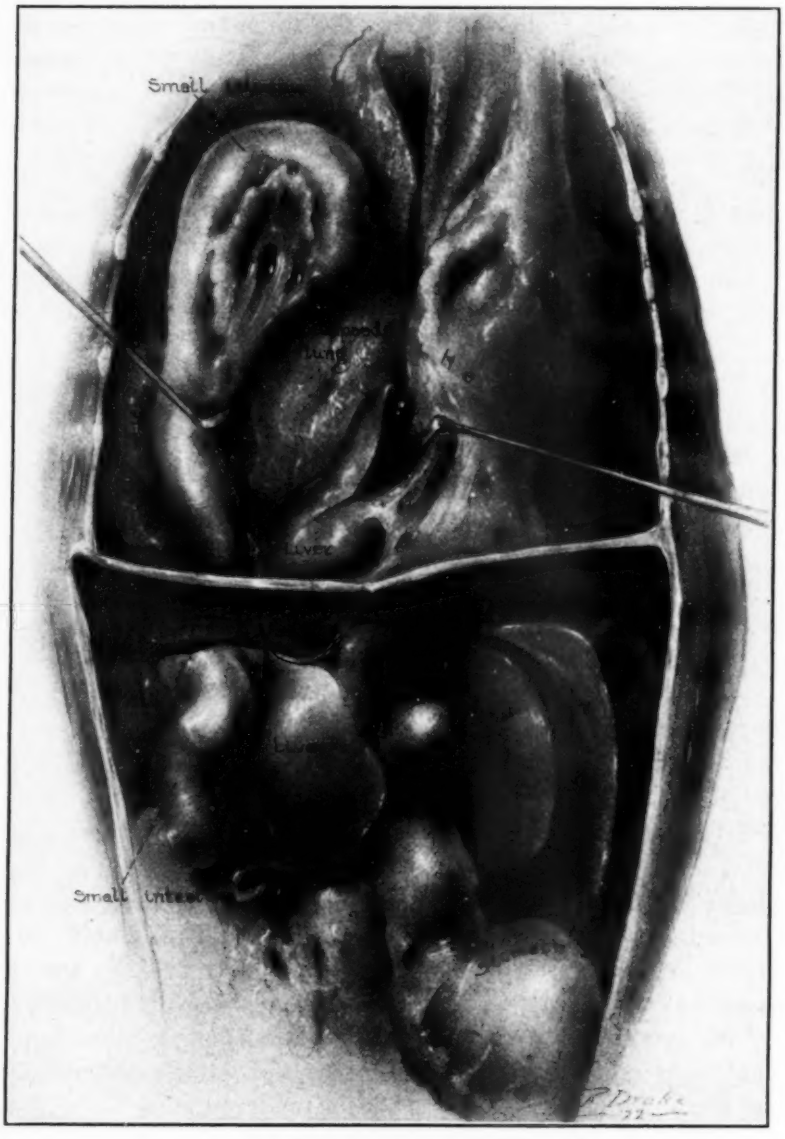

FIG. 1. Diaphragmatic hernia.

or suffered a severe blow or fall becomes suddenly permanently dyspneic, partially cyanotic, and shows more or less evidence of intestinal obstruction without other localizing signs to account

for the distress. However, any injury sufficient to cause a rupture of the diaphragm will in many cases rupture the liver also, with consequent fatal hemorrhage, particularly if the animal is well-fed and plethoric.

The case described would not have been suitable for surgical repair because of the large opening and the danger of rupturing the liver in an attempt to replace the herniated lobes.

ABLATION OF THE UDDER

By JOHN F. RANKIN, *Astoria, Oregon.*

Beauty, a very fine and valuable pure-bred Guernsey cow, is owned by the Chicona Farm, at Chinook, Wash. She has a butter-fat record of 749 pounds in the BB class. Every living calf she produced has a value of from $500 to $1,000. Her last calf sold for $1,200.

In June, 1925, Dr. C. H. Seagraves removed a claw from the cow's hind leg, because of suppurative arthritis. The client did not follow instructions or give the proper after-care, which resulted in delayed healing. About September of the same year, I was called to examine the cow's udder and, on palpation, I found some hard, fibrous growths in one quarter. Udder ointment and massage were prescribed, but no benefit resulted and the lactation in that quarter was completely arrested within a month after this time.

In December I saw the cow again. The entire quarter was very hard and the other quarter on the same side was becoming affected in the same manner. In January both quarters were entirely filled with the same form of tissue. In March I was called to see the cow again. She seemed depressed. Her temperature was 103.5° F. She would not eat and was very emaciated. The attendant said she had become so in a week. Upon examining the udder, I found three quarters to be filled throughout with hard tissue, and the remaining quarter partly so. Around the base of the teats there were several fistulous tracts, with granulation tissue around the margin, exuding a bloody serum but no pus. The cow was three months pregnant. I advised the owner that ablation of the udder was necessary if he wished to save the cow for breeding purposes.

Chloral hydrate (2½ ounces) was given per os and the patient placed in a dorsal recumbent position. The field was cleansed and prepared for the operation. The udder was drawn through

a hole in a sterile sheet. The instruments were properly sterilized and plenty of catgut provided for ligating blood-vessels. Anesthesia was completed with chloroform.

An incision was made along one side of the gland, at a point that would admit of enough skin being left to suture together and cover the field after the gland was removed. The skin was dissected far enough up so that the boundary of the gland tissue could be seen where it attaches to the abdominal wall. All small arteries and veins were ligated or twisted, which is very necessary in a cow having a large udder, to prevent unnecessary hemorrhage. The nutrient artery and veins were located by blunt dissection and were ligated, each one at two points, to prevent reflux hemorrhage. These were then severed between the two ligatures. The same method was used on the opposite side and the gland was then removed by traction and blunt dissection from the abdominal wall. The cavity was packed with sterile packs and the skin was sutured, leaving a drainage opening, arteriorly, of about four inches. A quart of saline solution was given intravenously. The packs were removed the following day and the cavity irrigated with Dakin's solution, and daily after that until the wound was healed. The dissected gland weighed sixty pounds. The day after the operation, the cow was up eating grass. At the present time she is in fine condition and still carrying the fetus.

The laboratory test showed the specimen to be an adenoma. The pathologist reported that there was no evidence of carcinomatous cells and that the tumor would not have spread by metastasis and, therefore, was not malignant. He also stated that it was possible that this tumor might have spread by metastatic growth, as microscopic examination and diagnosis do not always agree with clinical symptoms. Many of the symptoms led me to believe that the tumor was of a malignant form.

Agriculturists must drop the idea which many industrialists got during the war, that they can be saved by government action or that any government department can act as a heaven-sent savior.—*The London (England) Livestock Journal.*

The doctrine of "Don't knock; boost" is excellent in all respects except its application. The country needs strong doses of purging truth, that there may remain only those elements worthy of being boosted.—*The Dearborn Independent.*

REVIEWS

La Tuberculose des Carnivores Domestiques (Tuberculosis of Domestic Carnivores). G. Lesbouyries, Chief of the Clinic at the Veterinary School, Alfort. 144 pages, with 15 figures and 2 colored plates. Vigot Freres, Paris, 1926. 20 fr.

The author has made a special study of tuberculosis in the dog and cat. He believes that he has accumulated sufficient evidence, as the result of his researches, to prove that tuberculosis in these animals is essentially comparable to the disease in man. He believes that knowledge of tuberculosis in the dog will assist in a better understanding of the disease in the human race.

Chapter I deals with the frequency of tuberculosis in the dog and cat. Chapter II discusses etiology and pathogenicity. Chapter III covers lesions and symptoms and is the most comprehensive in the book. Chapter IV goes into diagnosis and Chapter V, on the subject of treatment, gives the author's experiences with sanocrysine and tuberculin therapy.

A splendid bibliography is appended. The colored plates show renal tuberculosis in a dog and tuberculous conjunctivitis in a cat.

Laboratory Manual in General Microbiology. Ward Giltner, Laboratory of Bacteriology and Hygiene, Michigan State College. Third edition. 472 pages with 75 figures in the text. John Wiley and Sons, New York, 1926. Cloth, $3.50.

The third edition of this valuable handbook of bacteriology embraces all of the material of previous editions, together with new matter, the result of progress made during the past five-year period. The old system of classification of bacteria has been retained, we think wisely, particularly in view of the chaotic condition at present existing in bacteriological nomenclature.

As pointed out by the author, the work of d'Herelle and others on bacteriophage probably constitutes the most outstanding advance in the science during recent years. An exercise on the demonstration of the phenomenon has been included in the new edition. An exercise on the preparation of aggressin has replaced a former exercise on the preparation of blackleg vaccine. A detailed procedure on the Kahn precipitation test has been added.

The manual contains an appendix of almost a hundred pages. It contains an outline for the study of microbiology, Migula's classification of bacteria, directions for preparing special culture media, formulae for various solutions, lists of text and reference books and scientific periodicals, etc.

It is an agreeable surprise to note the great amount of useful material contained within the small compass of this book. It is systematically arranged and readily available by means of the very complete index. From the mechanical standpoint, the publishers of this book have lived up to their reputation.

ABSTRACTS

STUDIES ON ANTHRAX IMMUNITY. II—THE IMMUNIZATION OF SHEEP BY MEANS OF ANTHRAX BACILLI ATTENUATED WITH SODIUM CHLORIDE. S. J. Schilling. Jour. Inf. Dis., xxxviii (1926), 6, pp. 499-505.

In a previous publication there was reported a method of attenuation of cultures of *B. anthracis* by growing the bacilli through a series of six subcultures, made at weekly intervals, on standard agar containing 5 per cent NaCl. The sixth subculture was found to be practically avirulent for guinea pigs and rabbits, these latter animals having been successfully immunized by injections of this subculture.

In this publication are given the results of immunization of sheep by means of the NaCl-attenuated *B. anthracis*. The four sheep used were given 1, 2, 3 and 5 cc, respectively, of the attenuated culture, injections being made in each case in the inside of the right fore leg.

Judging from daily temperature readings, no general reactions occurred in any of the treated sheep nor was there any correlation between the quantity of bacterial suspension given and the subsequent temperatures of the animals. Local reactions were noted in all the animals. These appeared as small swollen areas which rapidly became more firm and smaller in size, but could be felt for a period of sixteen days.

Eleven weeks after treatment with the attenuated cultures, the four sheep so treated, together with two untreated ones, were given each 2 cc of a suspension of virulent anthrax bacilli injected in the subcutis of the left fore leg. The two sheep which

had received the small doses of vaccine showed more severe general reactions than did the other two, but all lived. The two controls died of anthrax, about 54 hours after inoculation.

S. S.

TESTS OF THE DE BLIECK-VAN HEELSBERGEN METHOD OF IMMUNIZATION AGAINST FOWL POX. T. M. Doyle, F. R. C. V. S., Ministry of Agriculture and Fisheries (of Great Britain). Vet. Rec., vi, 34 (Aug. 21, 1926), pp. 741-3.

As the result of experiments extending over three years, De Blieck and Van Heelsbergen, of Holland, introduced a biological product (antidiphtherin) for immunizing fowls against so-called fowl pox, a term employed in a general sense to include the various manifestations of the disease.

The vaccination is performed by removing the feathers from a small area of skin on the external thigh, about an inch above the hock, and then rubbing the vaccine into the follicles with the aid of a small scarifier, without drawing blood.

Doyle tested three lots of vaccine. These showed marked variations in potency, from which he concluded that the method used for attenuating the virus failed to give constant results. One sample was almost dead and conferred no immunity. Another appeared to be inactive, while the third produced lesions which led Doyle to believe that it was not in the least attenuated. Doyle remarks that, in such cases, crusts falling from inoculated areas may contaminate the ground with the virus and he suggests that the vaccine should be used only in infected flocks.

PROBLEMS ARISING IN THE CONTROL OF BACILLARY WHITE DIARRHOEA. L. D. Bushnell and W. R. Hinshaw. Poultry Science, v (1926), 6, p. 249.

The authors state that this subject has become more and more important with the increase in poultry population in the country and with the rapid transfer of poultry breeding-stock from one locality to another. The problems have been considered from three angles—that of the laboratory worker, the practical poultry-producer and the commercial hatcheryman.

Attention is called to the desirability of a standardized test. The authors believe two dilutions are best, that of 1-20 being low enough and 1-80 high enough to determine most of the dangerous carriers in a flock. Correlation of the test with field

results varies, some reactors showing average fertility and hatchability, some above average, some below average. Undoubtedly certain predisposing factors operate in this disease. The time required to rid a flock of bacillary white diarrhea will vary, of course. The authors believe flocks should be tested twice yearly and all reactors removed, after which the average owner will probably require three to five years to remove completely the menace of this disease from a flock.

The authors give the following conclusions:

1. That bacillary white diarrhea is an infectious disease.
2. That it causes much greater losses than are generally recognized.
3. That it may be eradicated from a flock by vigorous measures.
4. That it can not be controlled until poultry breeders realize the fact that a "carrier" may be entirely harmless on one day and lay an infected egg another day.
5. That the agglutination test is the only reliable means which we have at present for the detection of carriers.
6. That it will be impossible to eradicate this disease unless breeders are willing to eliminate all carriers from the flock, regardless of their value.

A more concerted effort is necessary on the part of all who come in contact with this disease. A few of the problems have been discussed in this paper, but there are many more which concern the producer, the hatcheryman and the laboratory worker. Without the cooperation of all these groups, poultry will continue to suffer severe losses from this disease.

E. L. S.

VETERINARY SLIDES AVAILABLE

The Department of Agriculture has available for distribution a new set of 51 lantern-slides, illustrating the varied veterinary activities of the Bureau of Animal Industry, such as those involved in enforcement of quarantine regulations, eradication of live stock diseases, and in scientific and educational work. The slides are intended primarily to acquaint live stock owners with the nature and operation of the federal veterinary service, and also to interest young men in veterinary medicine and surgery as a career, either in private practice or in the federal service, which frequently is in need of additional veterinarians. They will be loaned to responsible persons and organizations for limited periods, without charge. Apply to either the Office of Cooperative Extension Work or the Bureau of Animal Industry, Washington, D. C.

It costs about $7 to transport a ton of wheat from Chicago to the Liverpool market.

ARMY VETERINARY SERVICE

CHANGES RELATIVE TO VETERINARY OFFICERS

Regular Army

Lt. Colonel Robert C. Musser is relieved from duty in the Philippine Department and directed to report to the Commanding General, Army Medical Center, for duty as Commandant, Army Veterinary School, upon completion of his foreign service tour.

Lt. Colonel Wm. A. Sproule is relieved from duty in the Hawaiian Department and directed to report to the Commanding General, 2nd Corps Area, for duty as station veterinarian at Fort Jay, and as attending veterinarian at Ft. Slocum, Ft. Wood, and Harbor Defenses of Eastern and Southern New York and Sandy Hook, upon completion of his foreign service tour.

Captain Elwood L. Nye is relieved from further duty at Fort Brown, Tex., to take effect on or about November 8, 1926, and will then proceed to Washington, D. C., and report to the Surgeon General for duty in his office.

Lt. Colonel Walter Fraser is relieved from duty at the Presidio of San Francisco, Calif., and will sail on transport on or about Feb. 19, 1927, for the Hawaiian Department, reporting upon arrival to the Commanding General for assignment to duty.

Orders directing Lt. Colonel Walter Pick to report to the 2nd Corps Area Headquarters, New York, for duty upon completion of foreign service tour in Philippine Department have been revoked, and Lt. Colonel Pick has been assigned to duty as station veterinarian at Fort Omaha, Nebr., and as attending veterinarian at Fort Crook, Nebr., upon completion of his present tour.

Length of foreign service tour of Captain Jacob E. Behney extended four months.

Length of foreign service tour of Captain Raymond A. Kelser extended one year.

Captain Lester W. Ingram promoted from 1st lieutenant to grade of captain, effective Sept. 8, 1926.

Reserve Corps

New Acceptances

Second Lieutenants:

Farley, Herman.....Virginia Polytechnic Institute, Blacksburg, Va.

Lynch, Leland C.....1737 Tytus Avenue, Middletown, Ohio.

Promotions

Ralph A. Parsons, 203 Federal Bldg., Olympia, Wash., to captain.

Clinton D. Barrett, 50 E. Buchtel Ave., Akron, Ohio, to 1st lieut.

Separations

Bryant, Maynard L., 2nd Lieut. Declined reappointment.

Jacobs, Thomas Boyd, 1st Lieut. Transferred to Aux-Res.

Ward, Francis G., Captain. Resignation accepted.

Hamilton, Howard M., Capt. ORC status terminated because of National Guard status.

Hogg, James Seeley, 1st Lieut. ORC status terminated because of National Guard status.

Hyde, Roscoe, Capt. ORC status terminated because of National Guard status.

Morrison, Richard R., Capt. ORC status terminated because of National Guard status.

MISCELLANEOUS

A VEST POCKET ESSAY ON BATHTUBS

By I. K. ATHERTON, *College Park, Md.*

Bathtubs are a household utensil with which most persons are familiar—by sight at least—as practically every plumber's establishment has one on display. They are used for a variety of purposes. Some persons even employ them for bathing. Others, according to recently published court records, use them for serving champagne. This practice, however, is frowned upon by Mr. Volstead, and for that reason is probably less popular, if possible, than the water treatment. Bathtubs were introduced into the United States about sixty years before automobiles. Although the injuries and deaths caused by bathtubs have been practically negligible, the fear of automobiles has undoubtedly been the more completely subdued. This is borne out by statistics showing that there are more automobiles in the United States than bathtubs. In many well-regulated families the use of the bathtub is so intimately connected with Saturday night that if a member of the household inadvertently performs his ablutions at any other time, he looks for the funny paper the next morning. Popular substitutes for bathtubs appear to be bubbling fountains and deodorizers.

There is one place where the bathtub is appreciated more than the automobile, and that is the hog-lot. A well-arranged concrete wallow, located in a shady place, is enjoyed by the hogs, and no argument is needed to get little Johnny Shote to take his bath. Anything that improves the sanitary conditions in the hog-lot means better and cheaper hogs. Sanitation, in the broad meaning of the word, is all that can be done to promote health. The sanitary measures essential in the fight on hog cholera are the precautions necessary to prevent the hogs from getting the "bug." If the swine-growers of Maryland will see that their hogs do not get any infected pork in the garbage, table scraps or kitchen swill, they will eliminate 84 per cent of the new outbreaks. Precautions to prevent the introduction of infected hogs will stop 14 per cent more, and if the double treatment is not abused the other 2 per cent will be wiped off the slate. Without the primary or new outbreaks, there would be no spread of the infection or secondary outbreaks. The idea is feasible and it costs nothing to try it.

A VETERINARY EXHIBIT

Dr. A. E. Erickson, of Charlotte, Mich., for several years has had an exhibit at the Eaton County (Mich.) Fair. The exhibit may be unique, at least it is the only exhibit that has been reported, the handiwork and enterprise of an individual veterinarian. Here is what the Charlotte (Mich.) *Leader* said of the 1926 exhibit, illustrated in the accompanying photograph:

Veterinary Exhibit at Eaton County (Mich.) Fair.

Dr. A. E. Erickson has a full and comprehensive exhibit of veterinary equipment and instruments, as well as specimens of live stock diseases and injuries, in Agricultural Hall. The display includes a large number of "canned" specimens of internal growths and diseased conditions, and photographs of cases, all of which the doctor has attended himself. This is the only veterinary exhibit put on in the country as far as is known, and in former years has attracted the attention of the veterinary journals and other members of the profession all over the country. The technical features are all reduced to every-day language and the effort is of great educational value to the live stock owner and general public.

This exhibit is intended to be purely educational in character. It is the product of Dr. Erickson's own skill. He derives a great deal of satisfaction from it because it is his own idea, pure and simple. The exhibit has been favorably commented upon by other members of the profession who have seen it.

COLORADO ENDURANCE RIDE

Tomahawk, a half Morgan-half Thoroughbred bay gelding from Fort D. A. Russell, Cheyenne, Wyoming, won first prize in the 1926 Endurance Ride, held at Colorado Springs, September 13-18. The judges gave Tomahawk 60 points on condition and 35.02 on time, a total of 95.02 points. Sergeant Thomas Garrity,

the rider, received a cash prize of $700, a silver cup and several medals.

Second place went to Stella, a chestnut mare, half-Thoroughbred, from Fort Meade, S. D., with 92 points. Vamp, a bay gelding, also half-Thoroughbred, owned by Captain Harold N. Beeman, V. C., U. S. A., Fort Riley, Kans., was third, with 88.02 points. Prince, a standard-bred, from Cripple Creek, Colo., placed fourth, with a score of 75.07 points.

A cash prize of $100 in gold, for the rider displaying the best horsemanship through the ride, regardless of the position of his mount at the finish, was awarded Bill Johns, a 67-year-old cow-

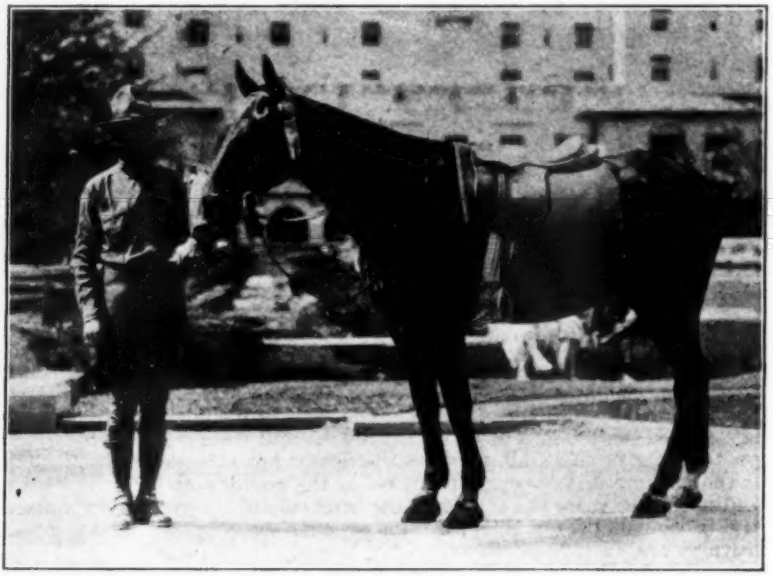

FIG. 1. Sergeant Thomas Garrity and his winning mount "Tomahawk."

boy, riding Ranger, winner of the 1925 ride. The award was based on Johns' excellent riding, in which he continually strove to protect his mount at all times. His horsemanship in bringing Ranger through the ride on the fifth day, when the gelding went out lame and came back in splendid condition, was a notable performance.

The contest this year was unusual, for the reason that the horses carried 225 pounds, instead of 200, as in previous years. Even with this extra handicap, six of the seven starters actually finished—the highest record ever attained in a ride. A record was established Wednesday, the third day, when all horses finished—the first time in the history of endurance rides in the

United States, when all horses lasted throughout the third day. Another record was established the fourth day, when six of the seven original entries finished. The same six horses finished the fifth day, establishing another record.

Mr. Wayne Dinsmore, secretary of the Horse Association of America, attended the ride this year as an observer. Mr. Dinsmore commented on the new records hung up in the 1926 ride by saying that the seven mounts entered this year were the most carefully trained lot of horses that ever participated in a Colorado endurance ride. He declared that the showing made by the

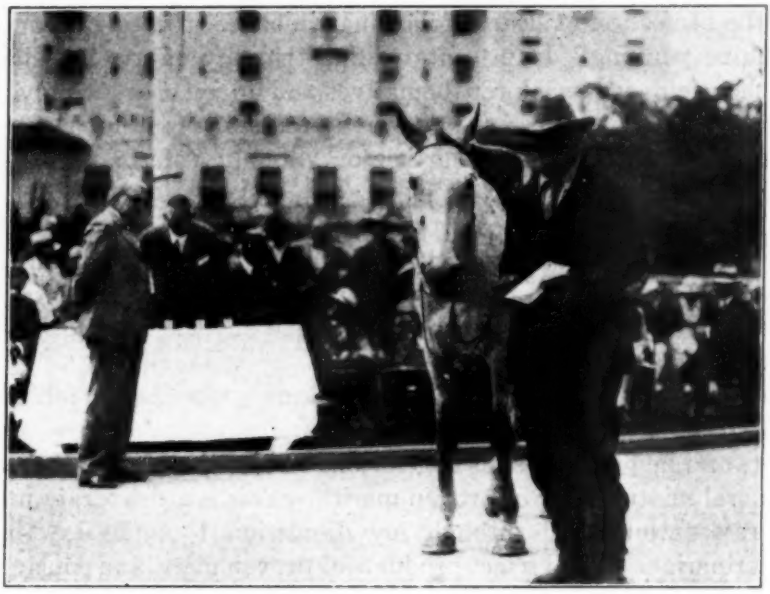

FIG. 2. Bill Johns, winner of the horsemanship prize, and his mount "Ranger." Judge Kinsley (in front of table) presented the prizes. Wayne Dinsmore is standing behind the table.

mounts clearly indicated that they had been prepared and conditioned with unusual care.

Dr. A. J. Savage, of Colorado Springs, who has acted in the capacity of official veterinarian for many of the previous rides, was not scheduled to officiate this year. However, owing to the absence of Dr. Charles F. Henry, of Kansas City, who was to act as one of the official veterinarians this year, Dr. Savage was called upon to fill in at the last minute and he readily responded, working for 2½ days, with Lieutenant Frank M. Lee, V. C., U. S. A., of Fort D. A. Russell, Wyoming. The judges were profuse in their praise of Dr. Savage's services.

COMMUNICATIONS

CLARIFYING THE MINERAL MIXTURE SITUATION

To the Editor:

The editorial in the May Journal entitled "Mineral Mixtures Again" places me in a somewhat peculiar position. I am grateful to Dr. Hoskins for a four and a half page advertisement, while at the same time I am human enough to object to my name being taken in vain as often as he does in the editorial. He is generous enough in the beginning to "think Dr. Koen has the best interests of the profession at heart" following which he tries to give me a genuine panning. I am quite willing that my efforts in behalf of the profession speak for themselves and do not fear a comparison of them with those of our worthy secretary for that matter. But to the question of my article on "Should Veterinarians Sell Minerals" and his reply.

There are so many glaring errors in the editorial that I cannot attempt to reply to all of them. First, I did not "fall into a trap." I was invited by the University of Wisconsin to discuss the question and I do not believe thay had any ulterior motive in extending the invitation.

After such an approach Dr. Hoskins proceeds as follows: (1) Dr. Koen tries hard to defend mineral mixtures and the peddlers and he predicates his conclusions on the assumption that all mineral mixtures are of proven merit". This is a deliberate misrepresentation. All through my discussion I emphasize that veterinarians should select products of proven merit and conclude as follows: "Cannot veterinarians use the mineral mixtures of PROVEN VALUE as a means of selling their services to a community without violating any professional code of ethics and without jeopardizing their status as professional men?"

(2) "that the indiscriminate feeding of mineral mixtures do no harm even if it does no good." I was discussing his absurd proposal that veterinarians attempt to diagnose a calcium deficiency or a phosphorus deficiency where he says—"If one is deficient it alone sholud be added"—and pointed out the difficulty of such a diagnosis and added—"The fact that there are reliable mineral products of PROVEN MERIT available; that in practice do correct these deficiencies in sufficient number of cases to be a credit to the veterinarian who has sold or prescribed them; and

that they prevent loss to the client who has used them; seems to be of much practical value and inclines us to the opinion this question (of veterinarians selling minerals of proven merit) should be answered in the affirmative. Furthermore, it has not yet been demonstrated that the administration of a good mineral product has produced harm even tho no deficiency exists of a particular element of the mixture." The above answers your other deliberate misrepresentation when you say "We were actually shocked to note that Dr. Koen strongly discourages the study of pathological conditions for the purpose of making a correct diagnosis, but rather puts a premium on the ability of a shot-gun preparation to relieve any condition confronting the veterinarian." I doubt if any one other than an office expert would attempt such a differentiation as deciding that "calcium alone" or "phosphorus alone" was deficient when making an examination of a case. The practitioner must frequently say he recognizes a deficiency but is unable to determine just what kind it is. However, his experience has been that under like circumstances he has used a mineral mixture and the condition was corrected. Is such a proceedure "discouraging the study of pathological conditions?" If Dr. Hoskins had more field experience with practitioners he would have less damfool notions about differentiations.

(3) "that veterinarians are the logical distributors—even salesmen— for mineral mixtures." Once, and only once, has he quoted me correctly. I believe by their training and experience they are the logical ones to recognize a worth-while product; that they will know best when a client will be benefited by it's use; that they are best qualified to prevent their clients being roped in on a worthless product obtained from any one of many peddlers, etc. I believe nutritional problems are veterinary problems and should be treated by veterinarians rather than by stock food agents, county agents, or other agents. We have permitted this phase of veterinary service to get into other hands because we have not been awake to our opportunities. In the same manner we let swine sanitation get away from us. And to a considerable degree it was our own fault that much swine vaccination has been taken from us.

What constructive program has Dr. Hoskins as Secretary for our National association suggested to retrieve any of this lost ground? What has he proposed to even hold what we have left? Has he anything to offer to raise the ebbing morale of discour-

aged practitioners? What measures would he propose to correct a situation where thirty-five graduate veterinarians make application for the position of county veterinarian in a single county? Echo answers WHAT, other than to condemn them for trying to help themselves by taking the mineral business away from quacks and peddlers and get it back where it belongs —to the practitioner He would take away their commissions and feed them on ethics. It is easy for one who enjoys a good salary to sit in a comfortable office and muse over ethics. With the man in practice who has to face the storms of winter, the impassible roads of spring, the undesirable service attending parturition, the uncertainties of calls and of collections after the calls have been made, who must face daily the organized efforts against him as well as the individual efforts of numerous peddlers who continually drive his territory, with this man—the practitioner—it is not so easy to take your pallaver on ethics. There is a growing suspicion on the part of many practitioners that the A. V. M. A. is not entirely sympathetic with them, or that it is more interested in the other phases of veterinary work. Such editorials as yours of June 1925, and May 1926, do not tend to allay these suspicions. These editorials should be accepted as the opinions of an individual and not of the A. V. M. A. Permit me to suggest that you get out for a while with these men, eat with them sleep with them, gain their confidence and have them show you their books, and you will learn some things that will enable you to write more intelligently concerning them and their activities.

(4) "that it is splitting hairs to differentiate between prescribing and peddling." There is nothing in my article that even intimates that I propose for veterinarians to become peddlers.

(5) "and that it is perfectly ethical and in keeping with professional etiquette to solicit veterinary work, from owners of live stock—perhaps clients of some colleague—but that does not matter." Again he reads into my remarks inferences relative encroachments on a colleague and the solicitation of veterinary work. I deemed it an insult to the intelligence of the audience I was addressing to point out such gross indiscretions. I considered my hearers gentlemen of intelligence and honor in matters of professional decency. Dr. Hoskins might learn if he would associate with practitioners for a time that they are not subjects for kindergartens but are well informed, well trained, and fully competent to deport themselves as becomes members of any learned profession, and at the same time furnish their clinets all

the minerals their needs require. Furthermore, their clients will save more money and make more money by patronizing their veterinarians than by listening to the high-pressure stuff of stock food peddlers.

I am next invited to submit a bibliography to substantiate my statement "the benefits that have been derived from their use (minerals) has furnished material for volumes of statistical records and research observations. Practically all nutritional experts attest their value." Really Dr. Hoskins, don't you read the papers, and publications of the various experiment stations? The readers of the JOURNAL do not need such a bibliography, they are all quite well informed in the matter. A careful reading, however, of "the excellent report of the National Research Council on 'Mineral Nutrient Requirement of Farm Animals' " will furnish an unbiased and unprejudiced mind with much information along the lines I have indicated. For your particular benefit you might read Bulletin D-91 of the Iowa Agricultural Experiment Station reporting a feeding experiment where pigs that were given minerals with their rations reached the desired weights—225 pounds—ninety days before other pigs in the experiment from which the mineral supplement was withheld, and at a saving of approximately 350 pounds of grain. "But that doesn't matter." Again read Leaflet No. 16 dated April 1926 from the same station. I am afraid you will throw it in the waste basket after reading the first three lines because it dares show some evidence contrary to your opinion. It says, "In four different comparisons the feeding of 1 ounce of a simple mineral per two-year-old steer daily, has increased the average margin, over and above feed costs, $4.75 per steer." What does ninety days less feeding time or a saving of 350 pounds of grain, or the hitting the May market instead of the later lower market mean to the hog feeder, or an increase of $4.75 increase per steer to the feeder of cattle? Your intentions may be good, Dr. Hoskins, but you surely exhibit a woeful lack of information as regards the benefits of minerals. I have talked personally with some of the nutritional experts you mention and if I was at liberty to quote their remarks to me it might be enlightening to you.

Your invitation to practitioners to quit practice if they wish to sell minerals to their clients will not be accepted by many of them. In Wisconsin, in Illinois, in Indiana, and in other states the men in practice are going to continue to get this business back to the profession where it belongs, regardless of what you may

think of it. This practice is not limited to a few obscure, inconsequential veterinarians but the very best men we have in our association are 'doing it'. I am not attempting to defend them. They need no defense. If they did, they are legion who could render a far more able defense than I can. Neither have I answered because of personal criticism of me. It has afforded an opportunity to point out some work the A. V. M. A. and you as its spokesman needs to give attention to, viz., the retreiving of lost ground and lost opportunities, the giving of constructive, helpful suggestions, rather than destructive criticism, the establishment of a program that will increase the morale instead of tearing it down, and the warning that practitioners are about in the same frame of mind as the corn belt farmers. I have not sought to agitate the matter but have attempted to clarify you many misstatements.

Bloomington, Illinois, J. S. KOEN.
June 10, 1926.

APPRECIATION EXPRESSED

TO THE EDITOR:

The following quotation is taken from a letter received from Professor Hutyra which we feel will prove of interest to the veterinary profession of America.

> Professor Marek and myself take this opportunity of expressing our sincere pleasure in that our American colleagues have received so favorably our textbooks, as proven by the appearance of the third edition. We find in the favorable reception of our publication a gratifying and pleasant confidence from the profession, which we honor and greatly cherish. . . . . .
>
> I would further request you to express to Dr. Mohler, as well as those colleagues who have participated in the preparation of the new edition, our grateful appreciation for their contributions, as I readily appreciate the great task which the translation of this work has required.
>
> With sincere regards,
> PROFESSOR FRANCIS HUTYRA.

The veterinary profession no doubt will be pleased with these comments of Professors Hutyra and Marek, who have rendered such eminent service for the advancement of veterinary science.

A. EICHHORN.

Pearl River, N. Y., Oct. 15, 1926.

The surplus has nothing to do with the losses involved in keeping cows which produce 2000 pounds of milk per year, or hens which average 60 eggs per annum.—*Dante M. Pierce in The Iowa Homestead.*

ASSOCIATION MEETINGS

ILLINOIS STATE VETERINARY MEDICAL ASSOCIATION

The forty-fourth semi-annual meeting of the Illinois State Veterinary Medical Association was held at the Hotel Abraham Lincoln, Springfield, July 14-15, 1926. President Roy E. Kluck, of Freeport, called the meeting to order at 10:00 a. m.

Dr. Burton R. Rogers, representing the Western Weighing and Inspection Bureau, was present and added a great deal to the interest of the meeting, opening each session with interesting and instructive films.

Hon. S. T. Stannard, Director of the Illinois Department of Agriculture, delivered the address of welcome. He took occasion to comment favorably upon the close relationship existing between the veterinary profession and agriculture; expressed his gratitude for the hearty cooperation always displayed by the profession, and hoped that, ere long, a sufficient appropriation might be available so that the accredited veterinarians might be used on an equal basis with the county veterinarians in the eradication of tuberculosis. An appropriate response was made by Dr. John S. Koen, of Bloomington.

President Kluck's address dealt very largely with the problems of the practitioner and the efforts that were being made to place the accredited veterinarian's work on an equality with the county veterinarian in tuberculosis eradication.

Under the head of unfinished business, the by-laws were amended, raising the salary of the secretary-treasurer from $50.00 to $100.00 per year.

Dr. W. J. Martin spoke on the matter of the veterinarian being no longer exempt from jury service. It seems that when the law raised the age limit, from 50 to 65 years, the veterinarian was left out. On motion of Dr. Mayo, seconded by Dr. Gieske, this matter was referred to the Committee on Legislation.

Dr. Kluck commented on some errors that had been discovered since revising our by-laws—Drs. A. C. Etchison and L. B. Michael having been elected to serve in districts in which they did not reside. On motion, this matter was allowed to pass over until the next meeting, with instructions for the persons to serve those districts for which they were selected.

Another error mentioned was that, in the re-districting, Will and Piatt counties had been omitted. Action on this matter was also deferred until the December meeting.

Dr. F. R. Whipple, of Peoria, was reported as being seriously ill, and the secretary was directed to send him a message of sympathy.

Ten new applicants were recommended by the Executive Board and unanimously elected to membership. It was moved by Dr. Martin, seconded by Dr. Lake, that our next meeting be held in Chicago, during the International Live Stock Exhibition, the date to be left to the Executive Board. Carried.

Quite a discussion arose over the above proposition. On various motions, the membership voted that it was desirable that only one meeting be held each year, and that that meeting be held during the summer. For some time it has been felt by many that the winter conference held annually by the University of Illinois, at Champaign, should displace one of our meetings. Many of our members always attend both of our State Association meetings, as well as the conference at the University, and if to these be added the U. S. Live Stock Sanitary Association, the A. V. M. A. and perhaps one or more county or district meetings, they felt that they were being taken away from their practice too much. A subsequent action of the Executive Board decided that the next meeting should either precede or follow the meeting of the U. S. Live Stock Sanitary Association. The secretary was directed to confer with the secretary of that association and arrange our dates accordingly.

Several communications from various county and district associations, throughout the State, asked that our efforts be directed toward securing recognition for the work of accredited veterinarians on the same basis as the various county veterinarians, and that indemnities be paid accordingly, as is being done in Iowa at present. This was referred to the Committee on Resolutions.

During a meeting of the Executive Board, several members asked to be heard relative to restricting admission, at the various sessions, to our membership and invited guests. Some untoward results that had occurred through permitting the attendance of county agents and other allied interests were cited, and it was brought forcibly to our attention that the meetings of the various medical and dental associations were held behind closed doors for the benefit of those professions alone. It was felt that the

interests of our profession would be much better served if a like policy were adopted by our Association, and in order that the matter be brought before the next meeting for final action, the following amendment to the constitution and by-laws was proposed. Amend Article IX of the by-laws, by adding thereto, the following:

> Section 6. Non-members or those in arrears for dues, shall be denied admission to the various sessions of the Association, except by special consent of the Association.

The literary program, consisting of lectures and questionnaires, interspersed with a few papers on special subjects, proved an interesting and instructive manner of dealing with the various subjects.

Dr. W. J. Martin, of Kankakee, was in charge of the Section on Equine Practice, assisted by Drs. F. H. Burt and J. E. Sargeant. Some of the high spots in the discourses were the following:

While agriculture is recognized as the foundation of all wealth, successful agriculture depends on motive power, and the horse furnishes the cheapest power.

As veterinarians, while we may be ever so capable in practice, as it relates to cattle, sheep, poultry or swine, let us remember that we are judged largely by the laity through our ability to cope successfully with problems of the equine race.

Discussion relative to the etiology of azoturia and so-called navel-ill, as well as their treatment, created much comment. The subject of large doses of anti-tetanic serum, given intravenously in acute cases of tetanus, disclosed advocates of doses as high as 100,000 units, that would tend to indicate the futility of such small doses as 10,000 to 20,000 units. The advantage and superiority of the intravenous over the intraspinal or subcutaneous methods of administration were universally acknowledged.

That the horse still remains supreme in the hearts of veterinarians is always attested by the animated discussions that invariably arise whenever an equine subject is before the Association. As is usually the case, this section could have been prolonged indefinitely and at its conclusion the interest would have in no manner abated.

The swine section was featured by a splendid paper by Dr. E. A. Tunnicliff, of the University of Illlnois, on "Observations on the Duration of Immunity in Baby Pigs Following Serum and Virus Treatment." This report covered 649 pigs, extending over a period of three years, that received serum and virus, at

two to eight weeks of age, with approximately 90 per cent immunity, on a six- to nine-months exposure. The lecture and questionnaires on this section were in charge of Dr. J. S. Koen and brought out some interesting points.

Sheep practice was strongly featured at this meeting for the first time in our history and proved of unusual interest. Dr. W. B. Craig, former dean of the Indiana Veterinary College, was in charge of this section. He presented his subject in a masterly manner that left nothing to be desired, and with the assistance of our former State Veterinarian, Dr. A. T. Peters, furnished a sheep program that probably has never been equaled at any state association meeting. That this branch of veterinary practice is of growing interest to our veterinarians was manifest to all, and although time was given over to the consideration of sheep problems at each day of the meeting, the interest in no manner abated. The veterinarians who failed to attend this meeting of their State Association were the losers.

An informal dinner at 6:00 p. m. and a theatre party constituted the evening program.

Thursday morning's program was concluded without the consideration of several subjects listed, which necessarily will be carried over to our next meeting. After the completion of the Section on Sheep Practice, Dr. Laird, State Veterinarian, addressed the Association informally on tuberculosis eradication and other subjects. Dr. Robert Graham, of the University of Illinois, also spoke informally concerning bacillary white diarrhea in poultry.

A short business session, followed by a clinic at the State Fair Grounds, in which poultry, canine and cattle featured, concluded the meeting.

W. H. Welch, *Secretary.*

NORTH DAKOTA VETERINARY ASSOCIATION

Most of the veterinarians living in North Dakota and several from neighboring states gathered at the North Dakota Agricultural College, Fargo, July 20-21, 1926, for the twenty-third annual meeting of the North Dakota Veterinary Association.

The first forenoon was devoted to committee reports, the president's address and Association business. The election of officers resulted as follows: Dr. G. A. Ottinger, Jamestown,

president; Dr. H. P. Roberts, Edgely, vice-president; Dr. H. L. Foust, Fargo, secretary-treasurer.

The following program was presented:

"Progress in Animal Disease Projects at North Dakota Agricultural Experiment Station," by Dr. A. F. Schalk, North Dakota Agricultural College.

Case Reports.

"Meeting the Problems of the Small Animal Practitioner," by Dr. H. J. Milks, Cornell University, Ithaca, N. Y.

"Differential Diagnosis of Diseases of the Head of Fowls," by Dr. J. R. Beach, University of California, Berkeley, Calif.

"Business Methods, Swine Diseases, and Pitfalls," by Dr. E. R. Steel, Grundy Center, Iowa.

"A Preparturient Disease of Sheep," by Dr. H. L. Foust, North Dakota Agricultural College, Fargo.

Clinics, by Drs. J. R. Beach, E. R. Steel and H. J. Milks.

The president, Dr. T. O. Brandenberg, in his address stressed the changing status of veterinary practice, the need for the veterinarian's ability to adapt himself to new conditions, and the necessity for including the veterinarian in successful public health work.

Dr. A. F. Schalk, in his discussion, stated that the so-called sweet-clover-hay disease does not seem to be a deficiency condition, that a fifteen-day alternation of sweet clover hay with other hay could not be relied upon to prevent the disease and that the condition was not transmissible by transfusion of blood from affected to healthy animals. The case reports were confined to discussions concerning losses following dehorning of cattle. The possible relationship of this condition to sweet-clover-hay feeding was brought out.

Dr. H. J. Milks spoke on the need of muzzles, an inexpensive microscope and other things required by the small-animal clinician. He gave a thorough and scholarly discussion of eye and skin diseases of small animals. One of the many interesting things brought out was the observation that many cases of follicular mange, even though apparently healed, may be transmitted to the offspring.

Dr. J. R. Beach, in his discussion of pox and canker in fowls, gave especial attention to the type of lesions present. He stated that roup is a non-infectious disease due to bad housing. Nutritional roup may follow the use of feeds deficient in vitamin A. Owing to the fact that poultry often will not travel far, they may suffer from deficiency disease even though a luxuriant growth of green feed is present. The white pustules on the oral mucous membrane, the white film over the third eyelid, the nasal dis-

charge and the uric acid salts deposited on heart, liver and other organs were described as symptoms of vitamin-A deficiency.

Dr. E. R. Steel discussed methods of making collections. He described the usefulness of his unique card, "Vaccination is cash." He stressed the rôle the veterinarian may play in making suggestions leading to a system of herd management in controlling pigging time and in controlling the size of pigs for vaccination. The status of drug-peddlers, who receive a commission for drugs administered by them in the treatment of animals, was discussed. Dr. Steel asserted that there is a deficiency disease of swine that is a real disease and not due to lack of minerals. Emphasis was placed upon the need of preparing pigs previous to vaccination. The value of records of serum and virus used and the worth of a professional technic above criticism were stressed.

The relationship of age, lack of exercise and heavy feeding to preparturient paralysis in ewes was brought out by Dr. Foust's paper.

At the clinic Dr. Beach demonstrated methods of restraint, methods of medication and portmortem technic on fowls. Dr. Steel demonstrated the use of the stomach-tube and of a vaccination-trough in treating swine. Dr. Milks demonstrated methods of diagnosis in small animals and canine ovariectomy.

H. L. Foust, Secretary.

ONTARIO VETERINARY ASSOCIATION

The annual meeting of the Ontario Veterinary Association, held at Toronto, August 11-12, 1926, was one of the most successful ever experienced in the history of the Association. The Program Committee is to be congratulated for the arrangement and the thanks of the Association was tendered to those who took part in it. The program was carried out under three, headings, namely, business, addresses and discussions, and clinic.

The morning of August 11 was devoted entirely to matters of business in connection with the Association. In the afternoon addresses were given. The first one, by Dr. R. A. McIntosh, Ontario Veterinary College, was on "Questions Referable to Therapeutics." In the address the speaker dealt chiefly with the treatment of depraved appetite in cattle, agalactia in milk cows, mammitis in cows and ewes, retained placenta in cows, and scours in calves and young pigs. Considerable discussion followed.

"Meat Hygiene" was the topic given by Dr. F. H. S. Lowrey, of the Health of Animals Branch. The author gave a very comprehensive and able paper on the subject and it was well received. Following this paper, Dr. A. L. McNabb, of the Provisional Board of Health, spoke on "The Veterinarian's Position with Regard to Public Health." Discussion at considerable length followed, Drs. Gwatkin, Gunn, Bond and others taking part.

The meeting then adjourned for dinner, following which the election of officers for the ensuing year took place. This election resulted as follows: Dr. R. W. Devereux, Brantford, president; Dr. R. A. McIntosh, Guelph, 1st vice-president; Dr. J. S. Glover, Toronto, 2nd vice-president; Dr. H. W. LeGard, Weston, secretary. Executive Committee: Drs. J. C. Brown, Markham; J. A. Campbell, Toronto; Ronald Gwatkin, Guelph; J. E. Mumford, Toronto; and C. D. McGilvray, Principal of the Ontario Veterinary College, ex-officio member.

The evening session of the meeting was made especially interesting in that three notable members of the profession, Dr. L. A. Merillat, of Evanston, Illinois; Dr. A. Savage, Manitoba Agricultural College and Dr. C. D. McGilvray, Principal of the Ontario Veterinary College, were the speakers.

Dr. Merillat, at the request of the chairman, was introduced by Dr. McGilvray, after which he launched into his topic, "Progress in General Practice," in his aggressive and characteristic manner well known to the profession all over the continent. Dr. Savage gave a splendid illustrated lecture on "The Examination of Bulls for Genital Unsoundness." The educational value of his address was greatly enhanced by the use of slides showing normal and diseased spermatozoa. Dr. McGilvray spoke on "Contagious Abortion."

The second day of the meeting was wholly devoted to clinics, which were held at the farm of Lady Eaton, about twenty miles north of Toronto. Sterility examinations were conducted by Drs. Savage, Le Gard and McIntosh; horse clinics by Drs. Merillat, Fowler and Devereux; chicken clinic by Dr. Gwatkin. At the conclusion of the clinic a vote of thanks was tendered Lady Eaton and the farm manager for the lunch provided and also for the building in which the clinic was held.

R. A. McIntosh, *Res. Sec. for Ontario*

NORTHEASTERN PENNSYLVANIA VETERINARY MEDICAL CLUB

The Northwestern Pennsylvania Veterinary Medical Club met at Woodlawn Manor, near Fleetwood Corners, Pa., August 28, 1926. This is a farm owned by Mrs. Harry Jones, widow of the late Harry Jones, who died in June last, and who was, prior to his death, founder and head of the Woodlawn Farm Dairy, a subsidiary of the United States Dairy Products Corporation. The live stock at Woodlawn Manor is pure-bred and some of the finest specimens of the Guernsey and Jersey breeds are found here. The same is true of Belgian horses.

Dr. G. A. Dick, of the University of Pennsylvania, gave a demonstration in "Live Stock Judging of the Dairy Type," which proved to be very instructive to those present, including some eighteen veterinarians, eight lady and eight gentleman visitors.

THOMAS D. JAMES, *Secretary.*

SOUTHEASTERN MICHIGAN VETERINARY MEDICAL ASSOCIATION

Monthly meetings of the Southeastern Michigan Veterinary Medical Association were inaugurated with the meeting in Detroit October 13, 1926. Previously the Association has been holding quarterly meetings, but in June it was decided to try the experiment of meeting monthly. There are in the neighborhood of one hundred veterinarians located in Wayne, Oakland and Macomb counties, the territory covered by the Association, and there is no reason why monthly meetings should not be both popular and valuable.

The Committee on Program, consisting of Dr. E. P. Schaffter, Dr. H. Cornehl and the Secretary, reported on their plans for future meetings. At the same time, the members of the Association were asked to express their preferences on several questions in connection with the meetings. It was decided to hold the meetings, for the time being at least, in the Board of Health headquarters, and to stick to the second Wednesday in each month for the meeting date. The members expressed a decided preference for dinner meetings, as a result of which a dinner will be served as a part of the regular program of every meeting.

The following veterinarians were admitted to membership: Drs. J. E. Patterson, A. C. Curtiss, B. H. Swim, all of Detroit, and

Walter F. Ball, of Lincoln Park. The Secretary was called upon for a report of the Lexington meeting of the A. V. M. A. This is always a feature of the program of the first fall meeting. Dr. B. J. Killham, state veterinarian, was present and gave a very interesting talk on a number of features in connection with the National Dairy Show, which was brought to a successful close the day of the meeting.

H. Preston Hoskins, *Secretary.*

EASTERN IOWA VETERINARY ASSOCIATION

The annual meeting of the Eastern Iowa Veterinary Association, held at Cedar Rapids, October 13-14, 1926, broke all records for attendance. Approximately 200 veterinarians were present and the names of eighty-six ladies appeared on the registration list. New members to the number of forty-two were admitted. The attendance exceeded the fondest hopes of the local committee on arrangements, the members of which were literally swamped by the large crowd during the two days of the meeting.

President Glenn delivered a masterly address which contained many thoughts that should have the serious consideration of every member of the profession. It is to men of Dr. Glenn's type that we must look for guidance, when we have the welfare of our chosen profession at heart.

Dr. N. W. Ackerman, of Van Horne, presented "Baby Chick Troubles." He covered the subject in a very thorough manner and in a way that was practical.

Due to the prevalence of hog cholera and the shortage of serum, a great deal of interest was taken in this topic, as presented by Dr. T. P. White, assistant chief of the Division of Hog Cholera Control, Bureau of Animal Industry. Different phases of the subject were discussed by Dr. A. H. Legenhausen, of Cedar Rapids; Mr. M. G. Thornburg, secretary of agriculture, Des Moines; Dr. H. E. Curry, of the United Serum Laboratories, Wichita, Kans.; and Mr. G. H. Williams, of the Corn States Serum Company, Omaha, Nebr. Dr. White had been sent from Washington to gather first-hand information relative to the seriousness of the outbreak of hog cholera throughout the Corn Belt.

Mr. M. G. Thornburg presented "The Department of Agriculture and the Veterinary Practice Act." From what Mr. Thornburg said in his paper and from the discussion which followed, it is fair to conclude that closer cooperation between the Depart-

ment and practitioners is already in the making. It is to be hoped that the plans now under consideration to facilitate the curbing of infractions of the Veterinary Practice Act will materialize and the live stock industry will be materially benefited thereby.

Mr. George Judisch, of Ames, who occupies a warm spot in the hearts of the veterinarians of Iowa and who has appeared on the programs of veterinary association meetings on numerous occasions, gave a talk which dealt mostly with peddlers and venders of various drug mixtures intended for animal use. His talk was practical, instructive and highly interesting.

Mr. Ney W. Brooks, branch manager of the Sioux City Serum Company and secretary of the Publicity Committee of the Association, reviewed the work of the Committee for the year and showed, among other things, that this Committee had obtained publicity in the form of newspaper articles which, if computed at one-half the ordinary advertising rates for the average Midwestern daily, would have cost over $11,000, or an average of about $225 per week. The press notices prepared by the Committee have appeared, on an average, in 150 papers weekly. The subject of publicity was further discussed by Drs. L. A. Merillat, of Chicago, and Dr. C. H. Stange, of Ames.

A question-box was conducted by Dr. A. T. Kinsley, of Kansas City, Mo., and proved go be one of the most interesting features of the meeting.

For the banquet, entertainment and ball, the evening of the first day, the Crystal Room of the Hotel Montrose had been secured. Although this was the largest room available in the city, it proved far too small to accommodate the crowd which overflowed into the halls and balcony.

The program Thursday morning was opened with a paper on "Colics in Horses," by Dr. J. W. Griffith, of Cedar Rapids. This was followed by a long and interesting discussion, which proved beyond any reason of a doubt that interest in horse practice is as keen now as it has ever been. Dr. Henry Hell, of Wilton Junction, followed with a paper on "Practice Building." Dr. Hell took up those fundamentals which are essential to success in any undertaking, such as honesty of purpose, concurrence with the laws of Nature, recognition of principles of proven worth, knowledge of limitations and the value of promotion of faith with understanding between veterinarian and client.

Dr. D. A. Eastman, of Cedar Rapids, conducted a question-box on small animal practice in a mighty able manner, as a result of which much practical information was brought out.

At the afternoon session, Dr. H. E. Bemis, of Iowa State College, gave an illustrated lecture on surgery of the umbilical and inguinal regions of the horse and pig. This proved to be highly instructive, as the result of the very able way in which Dr. Bemis presented his subject. Veterinarians should not lose their interest in surgery and become rusty. There is a tendency in this direction nowadays, which may continue, until the horse becomes sufficiently valuable to warrant the performance of major operations.

Dr. R. C. ("Daddy") Moore, of St. Joseph, Mo., gave an illustrated lecture on surgical diseases of the udder of the cow. Dr. Moore also demonstrated several teat operations on two fresh udders secured through the courtesy of the veterinary inspectors at the Sinclair packing plant.

A full two-day program of entertainment was arranged for the ladies, including a theatre party and luncheon, the banquet, entertainment and ball, an automobile ride over the City and a boat trip on the Cedar River. This elaborate entertainment was made possible through the generosity of the commercial firms serving the profession in this territory.

Officers for the coming year were elected as follows: President, Dr. F. R. Ahlers, Lamotte; vice-president, Dr. Irving Moles, Central City; secretary-treasurer, Dr. John B. Bryant, Mt. Vernon; member of the Executive Board, Dr. H. A. McIntyre, Maquoketa.

HENRY HELL, *Chairman, Publicity Committee.*

ANOTHER WORRY

A Scotchman consulted a doctor about his health, complaining of loss of appetite. The doctor recommended more exercise, and advised him to take his horse out of the stable and go for a 15-mile ride every day. "You'll soon regain your appetite if you do that," said the doctor.

"Ah," said the patient, "but what about the horse's appetite?"

—*Rotterdam Dambad.*

It is estimated that approximately 2,500,000 farmers did a $2,500,000,000 business in 12,000 cooperative organizations in America last year.

NECROLOGY

HOWARD SYLVESTER MURPHEY

Dr. H. S. Murphey, Professor and Head of Veterinary Anatomy and Histology in the Iowa State College since 1913, died a tragic death by his own hand, September 25, 1926. Only 43 years of age, his death removes from the veterinary profession an outstanding anatomist, a tireless investigator and an unusually successful teacher.

Shortly after his graduation from the Ohio State University, in 1908, Dr. Murphey went to the Iowa State College, and became a member of the veterinary faculty. The place that Dr. Murphey won for himself in the hearts of his co-workers is fittingly expressed in appreciations prepared by two of his associates and published in this issue of the JOURNAL. These will describe the personal attributes of Dr. Murphey, making unnecessary any attempt to extol his many virtues by one less intimately acquainted with him.

Dr. Murphey joined the A. V. M. A. in 1912. He was a member of the Committee on Anatomical Nomenclature from 1915 until the work of the Committee was finished, in 1923. He served as chairman of the Committee for three years, 1918-1921. In 1925 he was appointed chairman of the Committee on Abortion, in recognition of his investigational work in the field of sterility, so intimately associated with the abortion problem. The report made by this committee at Lexington was a marked departure from the reports of the same committee of previous years. It is no less valuable, by reason of its unusual character, and reflects in only a small way the vast amount of work that Dr. Murphey did, as chairman of the Committee. He plunged into it, heart and soul, just as soon as he was notified of his appointment. Dr. Murphey did things just that way.

A wife and two adopted sons are left to mourn his loss.

The following tribute to Dr. Murphey has been paid by Dr. Charles Murray.

"Pat" is dead. There can be no irreverence in the term, for only the inner circle of his friends could use it and to them he was affectionately known as "Pat." Our hearts ceased to beat momentarily as the word of his sudden taking reached us. But there could be no mistake and now that the realization of the affair is upon us we remember him only as we knew him so well for seventeen years. He had his faults. So have we all. But his superior qualities of intellect, his steadfastness to his ideals, his love for his friends,

his loyalty to his institution and to his co-workers so far outmeasure his shortcomings that we can think of none of the latter.

He was raised in the rough, making his own way from early boyhood to the completion of his college career. In the logging-camp or the steel mills or the class room, it was all a battle and he developed a combative spirit that carried him past all obstacles. But in his later years he had mellowed. Externally brusque on occasions, there lay beneath that brusqueness as tender a sympathy, as fine a feeling for his fellows as ever was possessed by any man. Students stood in awe before him until they came to know and appreciate him and, on their return to the College as alumni, their first inquiry was for "Pat."

He hated hypocrisy. He loved the truth. He is gone in the prime of his life. Why, we shall never know. Worries that he kept to himself instead of confiding to his friends wore him down and in his extremity he quietly and systematically arranged his earthly affairs and chose the means he used to relieve himself.

Sunset and the evening star
And one clear call for me
And may there be no moaning of the bar
When I set out to sea.

H. PERCY GILL

Dr. H. Percy Gill died at his residence, Jackson Heights, L. I., N. Y., September 27, 1926. The immediate cause of death was pneumonia, following a general decline in health dating from his return from France, with the A. E. F., in 1918.

Percy Gill was a son of the late Dr. Harry D. Gill, of New York. He received his preliminary education in the public schools of New York and entered the New York State Veterinary College at Cornell University. He completed two years in this institution and then finished his veterinary course at the University of Pennsylvania, with the class of 1908. He then returned to New York and engaged in private practice with his father, until the War, when both entered military service. Dr. Harry D. Gill (then Major) died October 3, 1918.

Popular with all, Percy's sunny disposition endeared him to everybody with whom he came in contact. Fond of pleasure, big-hearted, quick-witted, an easy-going man of the world, he nevertheless could be just as serious when occasion demanded.

Dr. Gill was a member of Alpha Psi Fraternity and was treasurer of the National Council, 1908-1910. He is survived by his widow and one brother.

WILLARD O. WYANT

Dr. Willard O. Wyant died at Albuquerque, N. Mex., August 7, 1926. Born at Thorntown, Ind., January 21, 1890, Dr. Wyant received his veterinary education at the Indiana Veterinary Col-

lege and was graduated in 1913. He served in the World War and, while in the service, contracted tuberculosis, which was the cause of his death. He was a patient sufferer, had a splendid personality and was held in high esteem by all who knew him. Dr. Wyant had been located in Albuquerque for about six years and conducted a small animal practice there.

HARRY P. BASINGER

Dr. Harry P. Basinger, of Aberdeen, S. Dak., died September 18, 1926, following injuries received in an automobile accident near Aberdeen. Dr. Basinger was returning from the country when his automobile was struck by a train at a railroad crossing west of town, killing him and severely injuring his assistant, who was riding with him.

Born in Columbus Grove, Ohio, Dr. Basinger received his early education in the public schools and later entered the Grand Rapids Veterinary College. He was graduated in 1915 and practiced for a short time at Columbus Grove. He then went to South Dakota and was engaged as deputy state veterinarian in tuberculosis and scab eradication. About 1917, he located in Aberdeen, first as the assistant of Dr. J. W. Elliott and later practicing on his own account. In 1918 he enlisted in the Veterinary Corps, served overseas for ten months and was discharged in the fall of 1919, returning to Aberdeen to resume his practice there. Dr. Basinger also conducted a live stock business as a side-line.

Dr. Basinger was very well liked in the community and had a host of friends. He was a captain in the South Dakota National Guard, held a commission in the Reserve Corps and was a member of the South Dakota Veterinary Medical Association. He is survived by his widow, three daughters, a father, five brothers and three sisters.

ADDISON SPURLING

Dr. Addison Spurling, of Crystal Lake, Ill., died at the Woodstock (Ill.) hospital, October 15, 1926. He was found unconscious on the floor of a restaurant in Crystal Lake, where he had resided for a number of years, the evening before his death. The cause of death is unknown. Dr. Spurling was a graduate of the McKillip Veterinary College, class of 1898. He is survived by one son and one daughter.

ARTHUR S. COOLEY

Dr. Arthur S. Cooley died at his home in Dover Center, Ohio, October 5, 1926. He had not been in good health for some time. With his passing the veterinary profession lost one of its staunchest supporters and Ohio one of its most public-spirited citizens. Few veterinarians have reflected as much credit upon the veterinary profession, through their civic activities, as did Dr. Cooley during the two score years of his useful professional career.

Born at Dover Center, Ohio, June 11, 1858, he attended local schools, Ohio State University, Eclectic Medical College (Chicago) and Chicago Veterinary College. He was graduated from the latter institution in 1887 and practiced in Cleveland for thirty-five years. In 1915 he was appointed state veterinarian of Ohio by Governor Willis.

Dr. Cooley was a member of the 84th, 85th and 86th General Assemblies of Ohio and was nominated for a fourth term in August last. His re-election in November was practically assured. He served as a member of the Public Health, Tax, Agriculture and other important committees of the House of Representatives. He organized the Veterinary Section of the Cleveland Academy of Medicine and the Bureau of Food and Dairy Inspection of the city of Cleveland, now one of the most important bureaus in the City Health Department.

Dr. Cooley joined the A. V. M. A. in 1900 and, during the more than a quarter century of his membership, had many important committee assignments, in addition to serving twice as vice-president (third vice-president, 1910-11; fifth vice-president, 1919-20). He served as Resident Secretary for Ohio, 1902-03; member of the Committee on Army Legislation, 1905-07; member of the Committee on Legislation, 1907-10; member of the Committee on Resolutions, 1911-12 and 1918-20; member of the Committee on Finance, 1912-13; member of the Committee on Intelligence and Education, 1915-16; chairman (1916-18) and member (1920-21) of the Audit Committee; and chairman of the Section on General Practice, 1918-19.

As a member of the Ohio State Veterinary Medical Association Dr. Cooley served as president, 1913-14. He served one term as vice-president of the U. S. Live Stock Sanitary Association. He was a member of the Chamber of Commerce of Cleveland, the Western Reserve Club, the Army and Navy

Club, Troop A of Cleveland (the honor troop at presidential inaugurations) and Woodward Lodge 508 F. & A. M.

Dr. Cooley is survived by his widow, one son, Dr. Richard S. Cooley, two daughters and one brother.

JOHN COWAN RODGER

Dr. John C. Rodger, of Anderson, Ind., died at St. John's Hospital, October 9, 1926, after an illness of a few days. Death was due to uremic poisoning. A stroke of paralysis several years ago forced him to give up active work.

Born August 24, 1865, in Canada, Dr. Rodger located in Anderson following his graduation, as an honor student, from the Ontario Veterinary College, in 1887. He later built a veterinary hospital in Anderson and was associated with Dr. Cady. About 1917 Dr. Rodger sold his interest to Dr. H. A. Smith and entered the service of the Bureau of Animal Industry. He was stationed, for a time, at the Hughes-Curry packing plant in Anderson. He resigned his position about three years ago. For a number of years Dr. Rodger lectured on cattle pathology at the Indiana Veterinary College. He joined the A. V. M. A. in 1908. Dr. Rodger was quite prominent in Masonic circles. He never married and is survived by one brother and several sisters. Interment was made at Ayr, Ontario.

CHARLES I. FLEMING

Dr. Charles I. Fleming, formerly of Terre Haute, Ind., died in Minneapolis, Minn., October 10, 1926, following a stroke of apoplexy.

Dr. Fleming was a graduate of the Chicago Veterinary College, class of 1895, and practiced in Terre Haute for many years. He was one of the organizers of the Terre Haute Veterinary College and, in addition to the deanship, occupied the chair of surgery, also teaching judging, soundness, breeds and breeding, and dentistry.

Dr. Fleming joined the A. V. M. A. in 1909. He was a member of the Indiana Veterinary Medical Association and served as chairman of the Legislative Committee for several years. He was a past exalted ruler of the Elks. Dr. Fleming was active in Terre Haute politics and served as a member of the local Board of Health. He is survived by his widow, one daughter and one sister. Interment took place at Terre Haute.

H. C. BLACK

Dr. H. C. Black, of Erlanger, Ky., died at his home, October 13, 1926. Uremic poisoning, the result of a complication of diseases, was the immediate cause of death. He was 50 years of age and for eight years had been Kenton County (Ky.) Live Stock Inspector.

J. HONORIUS AUBRY

Dr. J. H. Aubry was instantly killed, October 20, 1926, in an automobile accident near Montreal. The car in which Dr. Aubry was riding was hit by the Montreal-Toronto flier of the Canadian Pacific Railroad. Dr. E. M. Eckert was riding with Dr. Aubry and was also instantly killed. Dr. Aubry was a graduate of the University of Montreal, class of 1917, and was an inspector for the Health of Animals Branch, Canadian Department of Agriculture.

E. M. ECKERT

Dr. E. M. Eckert, field veterinarian of the Health of Animals Branch, Canadian Department of Agriculture, was instantly killed in the same accident which resulted in the death of Dr. J. H. Aubry, October 20, 1926. Dr. Eckert was a graduate of the Ontario Veterinary College, class of 1918.

LOUIS O. LUSSON

Dr. Louis O. Lusson, of Ardmore, Pa., died at his home, October 21, 1926. He was a graduate of the University of Pennsylvania, class of 1888. Because of impaired eyesight, Dr. Lusson had not been able to practice his profession for quite a number of years.

JOHN WILLIAM ADAMS

Dr. John W. Adams, ex-president of the A. V. M. A., died suddenly at his residence, Swarthmore, Pa., at 9:30 p. m., Friday, October 22, 1926. Heart failure was given as the cause of death. Dr. Adams had complained of a slight indisposition during the day, but considered it to be nothing more serious than a slight attack of indigestion. He is survived by his widow and two daughters. Interment was made at Warsaw, N. Y., the

home of Mrs. Adams. A complete biographical sketch of Dr. Adams was published in the JOURNAL, September, 1925, following his election to the presidency of the A. V. M. A., at Portland, Oregon.

Our sympathy is extended to Dr. Earl G. Templeton, of Anamosa, Iowa, upon the occasion of the death of his father, Dr. H. M. Templeton, of Ames, Iowa, August 27, 1926.

MARRIAGES

Dr. Maynard Nighbert (Ont. '06), of Pittsfield, Ill., to Miss Audrey McKeever, of Winchester, Ill., Sept. 8, 1926, at Jacksonville, Ill.

BIRTHS

To Dr. and Mrs. J. Sidney Michum, of Kalona, Iowa, a daughter, Dulcie Lorraine, September 14, 1926.

PERSONALS

Dr. M. L. Morris (Corn. '26) has located in New Brunswick, N. J.

Dr. W. H. Frisbie (Wash. '22) has removed from Forsyth, Mont., to Pender, Nebr.

Dr. Wm. A. Rader (Gr. Rap. '16), formerly stationed in Detroit, has moved to Vassar, Mich.

Dr. O. E. Markley (Gr. Rap. '17) is now associated with Dr. F. D. Egan, of Detroit, Mich.

Dr. O. E. Walgren (K. S. A. C. '26) has removed from Denver, Colo., to Platte Center, Nebr.

Dr. G. E. Bradham (Ind. '11), formerly of Cisni, Ill., recently changed his location to Trenton, Ill.

Dr. T. A. Sigler (Ind. '02) recently acted in the capacity of judge at a horse show held at Pittsboro, Ind.

Dr. R. H. Bardwell (Corn. '26) is associated with Dr. M. M. Leonard (Cor. '14) in Asheville, N. C.

Dr. D. E. Bleecker (Chi. '09), formerly located at West Concord, Minn., has removed to Kasson, Minn.

Dr. C. R. Niday (Cin. '13) has changed locations from Washington Court House, Ohio, to Gallipolis, Ohio.

Dr. W. M. Lynn (Geo. Wash. '16) has requested a change of address from Lakeland, Fla., to Orlando, same state.

Dr. G. B. Jones (Ont. '94), of Sidell, Ill., is reported to be slowly regaining his strength, following his recent illness.

Dr. H. L. Morency (Colo. '25), who spent the past year at Michigan State College, has returned to Fort Collins, Colo.

Dr. J. B. Engle (Corn. '26) is a member of the staff of the Ellin Prince Speyer Hospital, 350 Lafayette St., New York City.

Dr. E. H. Queener (Cin. '18), formerly located at Jefferson City and Maryville, has located for practice at Sweetwater, Tenn.

Dr. J. R. Brown (McK. '08) has been reappointed county veterinarian for LaSalle County, Ill., at a salary of $3,900 per year.

Dr. J. Fergus Donnelly (Ont. '07) has removed from Campbellton, New Brunswick, to Charlottetown, Prince Edward Island.

Dr. O. G. Wiseman (O. S. U. '24) recently opened a small animal hospital and pet shop at 8220 Carnegie Ave., Cleveland, Ohio.

Dr. Geo. McCollister, of Kalamazoo, Mich., recently received a number of injuries of a minor character, in an automobile accident.

Dr. O. H. Bope (O. S. U. '13), of Amanda, Ohio, was recently obliged to take the Pasteur treatment, following a bite inflicted by a rabid dog.

Dr. Hugh Herron (Ind. '13) has been re-engaged for another year as county veterinarian by the Board of Supervisors of Iroquois County, Ill.

Dr. O. B. Morgan (K. C. V. C. '14), formerly located in Hutchinson, Kans., is now in Minneapolis, Minn. Address: 6340 Lyndale Ave., South.

Dr. George C. Faville (Iowa '79), who has been located at Hampton, Va., for so many years, has requested a change of address to Box 332, Phoebus, Va.

Dr. A. A. Lockhart (Ont. '04-McK. '05) has been transferred from Calgary, Alta., to Vancouver, B. C., and is stationed at the packing plant of P. Burns & Co.

Dr. William F. Riede (Cin. '11), city veterinarian of Louisville, Ky., is reported to be undergoing the Pasteur treatment, following the bite of a rabid dog.

Dr. E. J. Hart (McK. '11) has been re-engaged as county veterinarian by the Board of Supervisors of Livingiston County, Ill., at a salary of $4,000 per year.

Dr. Andrew Campbell (Ont. '89) has resigned his position with the Michigan Department of Agriculture to become city meat and milk inspector for Jackson, Mich.

Dr. J. H. Mills (Ind. '09), of Russiaville, Ind., was able to resume his practice recently, following an automobile accident in which he received a number of rather serious injuries.

Dr. Lester H. Howard (Amer. V. C. '82) tendered his resignation as director of the Division of Animal Industry, Massachusetts Department of Conservation, effective October 5, 1926.

Dr. D. E. Sisk (K. C. V. C. '15), of Mansfield, Ill., recently received fractures of one arm and one leg as a result of falling through a hole in a barn floor, while hunting pigeons near his home.

Dr. Roberto Plata Guerrero (U. P. '20), formerly of Bogota, Columbia, is taking the graduate course in bacteriology and pathology offered by the University of Pennsylvania Veterinary School.

Dr. S. W. Schuppan (Amer. V. C. '90), of Jersey City, N. J., resigned from the Bureau of Animal Industry in September, on account of ill health, and has gone to Jekyl Island, Brunswick, Ga., to recuperate.

Dr. Robert Graham (Iowa '10), of the University of Illinois, recently conducted a poultry clinic at the farm bureau at Paris, Ill., preceding a meeting of the National Highway Veterinary Medical Association.

Dr. T. L. Casserly (U. S. C. V. S. '11), of Indianapolis, Ind., who has been in the Canal Zone for a number of years, is taking a special course in bacteriology and pathology at the University of Pennsylvania.

Dr. J. A. Winkler (Cin. '18), of Newport, Ky., was one of the speakers at a recent gathering of physicians of northern Kentucky at the Highland Guernsey Farms near Newport. Dr. Winkler spoke on the subject of tuberculin testing and its relation to public health.

Dr. W. R. Kidwell (O. S. U. '19) has relinquished his practice in Boise, Idaho, and accepted an appointment in the Bureau of Animal Industry. Dr. Kidwell's first assignment was on the meat inspection force of Dr. E. D. Kennedy (K. C. V. C. '06), at Spokane, Wash.

Dr. D. H. Bennett (U. P. '15) has resigned his position at the Texas Agricultural Experiment Station, at Sonora, Texas, where he has been located for the past eight years. Until he makes a new connection, Dr. Bennett is receiving his mail at Box 534, Norwalk, Conn.

Dr. George A. Ferguson (U. S. C. V. S. '20), who has been in practice at Danville, Va., for six years, has accepted the appointment of dairy and food inspector for the Leaksville Township Board of Health, with headquarters at Leaksville, N. C. Dr. Ferguson entered upon his new duties October 15.

Dr. Thomas H. Edwards (K. C. V. C. '09) resigned from the Bureau of Animal Industry, September 15, and returned to his home in Pasadena, Calif., with the intention of resuming private practice. Dr. Edwards writes that he has made much more speedy recovery from the injuries received last spring than he had hoped for.

Dr. J. A. Allen (Ont. '16), for a number of years in charge of the Fox Research Station at Charlottetown, P. E. I., has resigned his position with the Health of Animals Branch, Canadian Department of Agriculture, to accept a connection with the Manitoba Fox Ranchers, with headquarters in Winnipeg. Dr. Allen is the senior author of the recently published book, "Theory and Practice of Fox Ranching."

BUREAU TRANSFERS

Dr. Geo. W. Trubey (Mich. '19), from Sacramento, Calif., to Lansing, Mich., on tuberculosis eradication.

Dr. DeWitt La Grange, from Lansing, Mich., to Augusta, Me., on tuberculosis eradication.

Dr. Ashley J. Clark (San Fran. '15), from meat inspection to tick eradication, Fort Worth, Texas.

Dr. Wm. E. Turner (Chi. '18), from Fort Worth, Texas, to San Antonio, Texas, on tick eradication.

Dr. Albert E. Rishel (Chi. '89), from New York, N. Y., to Athenia, N. J., in charge of inspection and quarantine of imported live stock.

Dr. Warren Sorrell (K. C. V. C. '07), from Cheyenne, Wyo., to Lincoln, Nebr.

Dr. E. F. Thomas, from Philadelphia, Pa., to New York, N. Y., on meat inspection.

Dr. Arthur L. Blake, from Chicago, Ill., to Sioux City, Iowa, on meat inspection.